OCTOBER, 1941 PROJECTS' NUMBER

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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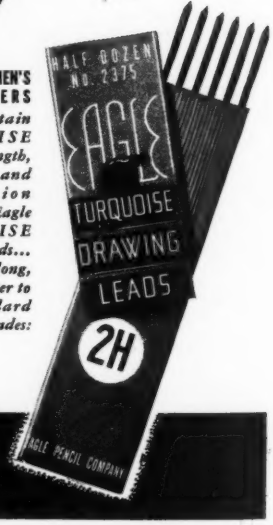

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

VOL. 30 | OCTOBER, 1941 | Number 8

THIS ISSUE

As was announced in the September number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, this issue has been quite largely devoted to a wealth of well-chosen problems and projects. All of them have an appeal to both the home shop and the school shop.

Twenty-two of those chosen are of interest to the metalworker, seventeen to the woodworker, one to the printer, one to the electrician, and one to the maker of pottery.

In a number of the projects, different kinds of material, like wood and iron, are combined to make the finished article.

THIS MONTH'S COVER

The photograph used for the cover this month shows a blast furnace in operation. Photograph, courtesy of the Carnegie-Illinois Steel Corp.

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To date, twenty-eight brief articles similar to the one above and dealing with the more commonly used woods have appeared in these ads. As in the past, we continue to invite your suggestions as to the species of wood you would like featured in this series.

YATES-AMERICAN

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

Adult Training for Home Defense

EARL M. BOWLER*

With the newspapers carrying headlines of "all-out aid to Britain," preparation for "total defense," and other coined phrases which have sprung up in recent months, one wonders what these words mean to the average American. Plans have been drawn for the training of civilians for "total defense" and "all-out aid to Britain," but where does the day vocational and adult evening school fit into these training plans, and why hasn't more of this training gotten under way these several months?

During World War I many high school children picked the "sticks" out of okum in poorly lighted storage rooms in school basements. Many trench candles were rolled from newspapers by the "kids," and the wax-dipping of these stubby wads resulted in fun for all. Sewing and knitting for the Red Cross took the country by storm, while a variety of allied occupations kept many hands busy. A new kind of war has been going on around us during the past few months — a war wherein there is much to be done by the civilian population besides picking okum and knitting sweaters. If we are to make total defense something besides a catch phrase, then we have a big job of civilian-vocational training to do.

To point out what will have to be done if and when war comes to us, we might consider what the English are now doing in the training of their blitz victims. Rehabilitation of these maimed and bomb-shocked people has been undertaken by those who have had a successful recovery from World War I. Recreation is the first step in the restoration of self-confidence to human beings who have lost friends, relatives, eyesight, limbs, and more. Simple games, reading in Braille, talking books, and the like keep these military and civilian victims of modern warfare from sinking into maniacal derangement.

As the victims of the blitz climb back to a point where they have the self-confidence and reliability necessary to carry out simple tasks, they are taught such useful trades as carpentry, weaving, and others requiring a like degree of skill, patience, and accuracy. Will the obsolete and rapidly being worn out vocational school machinery of this country be able to be used to train several hundred thousand youths who may return to our shores after we "get in." Moreover, what agency besides our vocational and adult schools would be capable of training several hundred thousand bombed victims if New York, Baltimore, or some other highly concentrated population center in America were to be hit.

Turning to the preparations for war we read that the owners of private sea-going craft are being enlisted to assist the coast guard in patrolling American ports and rivers. Certainly this task cannot be turned over to the uninitiated without some kind of instruction. Which of the existing governmental agencies is qualified to give such training is relatively unimportant; what is paramount, however, is whether vitally needed man power of the army, navy, or coast guard is to be taken from active duty to do this training job. Following another line of reasoning we might raise the question of whether civilian instructors under the United States Office of Education can train civilians for war activity or should some political appointee do the training while writing headlines?

Thousands of civilian fire fighters are needed in the larger cities to augment our puny now-existent peace-time organization. The job of testing hundreds of men to see if they possess the necessary qualities that make for success in fire fighting would be a sizable task in itself. One might easily conclude the job of investigating the loyalties of potential war-time firemen to be a rather lengthy and exacting task.

There are hundreds of specialized undertakings connected with modern air warfare that only governmental observers recently sent to England can tell us about. We have heard of a few of the more romantic tasks through their popularization by American writers. The incendiary snuffers, the suicide squadrons, patrols of a dozen varieties, and similar workers have taken the American fancy. Whether we have competent instructors among our civilian population to train such patrol workers is probably a military secret, but it would be good strategy if you and I knew a few people who could really go to work on a time bomb should the need arise some dark night.

Militarists have advertised the shortage of nurses for present-day army needs. Will we resort, too late, to "refresher" courses if several hundred persons are suddenly injured through a bombing or sabotage attempt in one of our concentrated production centers? A trained civilian population would be helpful in cases such as these; and, if adult training is the answer, there is a big job ahead. To wait for college professors and political bosses to tell us what is needed, and to show us how it should be done, bespeaks indolence and stupidity on the part of vocational and adult educators. This business of "total defense" training is a vocational-education job. The tasks to be done are so numerous and the scope so broad that the starting point is not yet in sight; moreover, where the end will be, no one knows.

One can imagine the need for such trained personnel as stretcher bearers, first-aid workers, fire fighters, disaster engineers, quantity food cooks, stewards, policemen, carpenters, cement workers, shelter makers, hospital workers, bomb excavators, pipe fitters, child-welfare workers, gas-mask technicians, and a host of other highly skilled workers well trained in war-time discipline.

Possibly right now we are missing a good bet by not training more and more women to do a variety of jobs recently held by men. Masculine control operators of electrical, sewer, water, and other equipment, whose major physical job is that of turning a valve or throwing a switch, may be supplanted by feminine workers as we inch ourselves into the conflict. Women will surely claim more and more of the clerical jobs as this year's crop of high

*Personnel Director, Rhinelander Paper Co., Rhinelander, Wis.

school graduates filters into employment. The factories will again open their doors to girls in increasing numbers as the supply of young males becomes more pinched. This shift in emphasis from the male to the female will create some training bottlenecks; the postwar shift back to the male will create attendant training problems for vocational educators at some future time.

Many old men are being "refreshed" in training classes while many more are rushed back to their former jobs sans training. This shift in emphasis back to the older, already retired employee, will modify our thinking concerning pensions. Our changed attitude toward keeping older men on the job longer is going to add to our training problems through the necessity for giving courses to refresh skills, create safety consciousness, and to help oldsters get along with other people.

One big problem in a mechanized war is the training of the great mass of people to be of some real help to themselves and their fellow men during a crisis. The basic human needs continue even under the heaviest bombings. People need food, clothing, and shelter regardless of whether a building stands, a warehouse is leveled, or a farmer has a cow. The wounded and the dying must be ministered to, whether they be military or civilian. In this new bombing warfare bent on breaking morale the Bible phrase, "Let the dead bury the dead," may be paraphrased to read, "Let the civilian take care of the civilian." Our civilian population will care for its own members in as satisfactory a manner as the military when vocational educators see their position in the scheme of things and get busy with training.

Even if we ignore completely the thousands of vocational tasks peculiar to a bombed area, we as adult educators might spend time training the civilian population in the niceties of discipline. Who among us has not heard of the chaos created by panic-stricken women, terror-stricken children, or fear-crazed men? How many in *our* civilian population have had the training offered by adult schools or the American Red Cross in first aid? How many people can remain calm and collected while dressing a mangled hand, a bashed head, or a broken leg. Disciplining the general populace may be a job for the military forces, but there are plenty of gaps that the civilian training forces can start filling at once.

Vocational educators are familiar with defense training for industrial needs. As the tempo of war increases, they may be called upon to train additional thousands in the basic skills. One thing is certain; as yet, our vocational schools are not being used to full advantage in a "total war" or emergency situation. When every young boy, physically able to work, has had an opportunity to demonstrate his mechanical aptitude and capacity to work with his hands, then we will have started. Several thousand good machinists could be developed in a matter of months through this type of testing program; yet, we let them go into law, teaching, or salesmanship while we struggle four years to teach "a hard one" a trade.

When this war is over we will still be faced with the problem of adjusting several thousand half-trained mechanics to the trades into which they have been hurriedly inducted. This may sound confusing to the uninitiated, but the trade-competent shop teacher understands the significance fully.

Beyond the point of finding the person with natural aptitudes for certain trades I shall not go because vocational men are familiar with their job of training workers for the defense industries. After establishing their training objectives[1] and strengthening their co-ordination programs,[2] outstanding end results have been met with in most quarters where good vocational training exists.

There are many possibilities in the co-operative effort of the military- and civilian-training agencies. In the type of warfare Hitler has rained upon Europe, the civilian population is sorely in need of the kind of training that could be offered by all competent training agencies skilled in human psychology. If "total defense" and "all-out aid" mean what the words imply, then vocational educators had better not rest upon their laurels, having trained a few thousand welders, machinists, and whatnots for industry's part in the preparation for war. America's civilian population is as unprepared for war today as it was the day I beat the bottom out of my Mother's washtub that eventful November morning back in 1918; yet, in those days we had eaten corn bread; we had bootlegged sugar; we had seen a soldier with a leg off; and we had said goodby to brothers, cousins, and friends. While we had not heard of an "all-out war," *experience* had given us some civilian training; and by comparison with the present, *we were prepared.*

[1] "National Defense Training Objectives," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, p. 111, March, 1941.
[2] "Co-ordinating National Defense Training," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, p. 183, May, 1941.

Values of Industrial-Arts Education In the Texas Junior High School*

CHRIS H. GRONEMAN[1]

The junior high school is defined by a majority of the leading educators in Texas as, "that period of education when the student is in the seventh and eighth grades"; in case of the 12-year school system, grade nine is also added to this period.

By point of contrast let us consider the changes in our educational system by making an imaginary visit to a junior high school *manual-training* shop of 20 years ago. Upon entering the room which was always located in the far corner of a basement, the group of boys would be informed that they were to have a sequence of assignments which must be completed in their respective order. In doing these, they must act as a group, completing each exercise on certain dates. These assignments consisted of the skilled performance in the making of eight common woodworking joints. The next exercise was the formal squaring procedure in making a block of wood to certain dimensions. In the application of the high grade of skill demanded, it was quite apparent that this group of exercises would last until the middle of the second semester. Then, as a seasonal project, each boy was expected to construct a highly skilled birdhouse; and one assumes that a very unusual bird would doubtless take up his abode therein, because of the immense amount of skill required in its construction. At the completion of this birdhouse the school year was ended.

The same group of boys return to the same manual-training shop and probably to the same teacher the following September. After duly explaining that the exercises of the past year were prerequisite and fundamental to the construction of worthwhile projects, the teacher encouraged the students to copy the breadboard, the useless taboret, and the footstool which he had on exhibition. Realizing that individual differences were not being taken into consideration, and also that it would be an impossibility to keep every student on the same level of operation, the teacher for the first time allowed the class mem-

*Address given at the Texas Vocational Association Convention, San Antonio, Tex., Mar. 30, 1940.

[1] Agricultural and Mechanical College of Texas, College Station, Tex.

bers to make a selection of any one of three other projects which were also on display. Throughout this entire two-year period, no mention had been made of a textbook or of study given in related information.

In direct comparison with the offerings of 20 years ago, let us visit a modern industrial-arts laboratory. We enter a new seventh-grade industrial-arts laboratory, and find that the teacher familiarizes the class members with some of the common tools, machines, materials, and products of modern industry; he stresses also certain phases of occupational opportunities. This information is presented by allowing the students activity in planning and obtaining experience with woods, metals, leather, and in two divisions of the graphic arts, namely bookbinding and printing. To realize the objectives of this wide offering the student augments the usual activity of project making by means of visual aids, texts, and supplementary reading material. The eighth grade, known as the laboratory of industries, offers similar experiences except that it is limited to four main divisions of planning, woods, metals, and electricity. The energies of the student are directed toward the acquiring of higher standards of workmanship, rather than permitting them to explore the wide interest spread of the seventh grade. He also makes use of teaching aids already mentioned. By no means must it be assumed that this is the only possible combination of offerings; these are merely cited as an example of what can be worked out in a two-year period.

In considering visual aids, it should be pointed out that these may be interpreted in various ways. A familiar and very efficient one is the journey or industrial visit, where the teacher and the student see the product in its various stages of evolution and in its natural setting. The second visual aid is visitation to museums of natural resources, where the true product is exhibited, but with an artificial background. The visual aid which we usually think of is the motion picture, either sound or silent, and the still film projection upon the screen. Other commonly used visual aids are the many wall charts which are prepared by industry and either given or loaned to industrial-arts departments. The last but not least important aid is the presentation of actual size models of projects or industrial products which may be displayed in the laboratory.

To understand this progressive change which has occurred, it is quite essential that we review the philosophical inception of the general shop movement. It is not a new idea or venture. Dean Russell of Columbia University in 1909 stated that industrial arts should be based upon educational and guidance values, rather than upon the training in specialized skills. He illustrated this point by showing the many changes undergone by a tree from its native stand, through the sawmill and kilns, to the finished products of furniture or parts of buildings. Dr. Frederick Bonsor, also of Columbia University, collaborated in 1910 with Dean Russell in establishing a general industrial-arts shop as a part of the Speyer Demonstration School program, wherein numerous divisions of work were offered under the supervision of one teacher. This undoubtedly was the spark that ignited the great movement for generalization of industrial-arts offering.

Statistical data has also been a pertinent factor in the reorganization of the industrial-arts program. From the bulletin "Occupational Statistics," we find that of the 40,000 apprentices listed, only 4000 or 1/10 are engaged in industries requiring wood as the core; and of the 14,000,000 adult workers, 1,100,000 are engaged in wood, 1,200,000 in metals, and the remainder of more than 11,000,000 are occupied in work not related to wood or metal. It is apparent from this, that appreciation and evaluation of industrial products will be distributed in proportion to the numbers engaged in their production.

Students in the seventh and eighth grades have the natural interest spread typical of adolescence; they are in an age of exploration and experimentation and are not eager to specialize. Consequently, crafts and hobbies make quite a center of appeal to students of this age. This is evinced by the number of boys who annually go to boy-scout and other summer camps, in order to gain information and skills in the many crafts which are offered. A similar diversity of offering in the general laboratory allows for a new type of individuality, following the axiom that one purpose of education is to render people different instead of indifferent.

If definite values are to be achieved in junior high school industrial-arts programs, the teacher must assume the responsibility, to a large degree, for the accomplishment of the 12 standardized objectives, as formulated by the industrial-arts section of the American Vocational Association. These are listed in a bulletin entitled "Standard of Attainment in Industrial-Arts Teaching," and are herewith quoted, with some pertinent comments:

1. To develop in each pupil an active interest in industrial life and in the methods of production and distribution.

In realizing this objective the student may study and learn how products are made through visits to local industries and a study of those that are located in distant cities. In such a program, information is given about the sources of raw materials, and methods of transportation and distribution. The student also learns that products have commercial sizes and names, and he is prepared to ask intelligently for them at stores. He may also learn of the occupational requirements and working conditions of the wage earners.

2. To develop in each pupil the ability to select wisely, care for, and use properly the things he buys and uses.

This may be considered consumer information or knowledge.

3. To develop in each pupil an appreciation of good workmanship and good design.

In order to develop these qualities, it is essential that the pupils be allowed sufficient practice with tools, and that the teacher maintain high standards of workmanship.

4. To develop in each pupil an attitude of pride or interest in his ability to do useful things.

The pride of a job well done is an index of good citizenship; every student should be required to do a few things well. Nothing is more detrimental than to allow him to barely get by.

5. To develop in each pupil a feeling of self-reliance and confidence in his ability to deal with people and to care for himself in an unusual or unfamiliar situation.

This necessitates a constant readjustment of procedure for the pupil, because he will be unable to have certain tools at the time when he needs them. The mastery of self-reliance and confidence comes through responsibility and meeting and dealing with others, so naturally the more experiences, the greater the development of these qualities.

6. To develop in each pupil the habit of an orderly method of procedure in the performance of any task.

It is obvious that before an order of procedure which is satisfactory to both the student and the teacher has been formulated, the student must analyze the job minutely.

7. To develop in each pupil the habit of self-discipline which requires one to do a thing when it should be done, whether it is a pleasant task or not.

The elements of reciprocity and sportsmanship enter into the achievement of this objective.

8. To develop in each pupil the habit of careful, thoughtful work without loitering or wasting time (industry).

The initiative and industry of the student is being tested and encouraged.

9. To develop in each pupil an attitude or readiness to assist others when they need help and to join in group undertakings (cooperation).

Cooperation is the keynote of the success of this objective.

10. To develop in each pupil a thoughtful attitude in the matter of making things easy and pleasant for others.

This will be an index of the foregoing objectives — a criterion as to whether or not they are being successfully administered.

11. To develop in each pupil a knowledge and understanding of mechanical drawing, the

(Continued on page 316)

WAYS THAT WIN

DEAN M. SCHWEICKHARD*

What Is It to Win?

One of the elements most deeply and universally intrenched in human nature is the desire to succeed at the things one attempts. Much less widespread and uniform, however, is the understanding of what it really means to succeed. Too many times winning is thought of in terms of personal victory over someone else. The embodiment of such an impression is to be found in a variety of life's relationships; between fathers and sons; sisters and brothers; rivals in love; competitors in business, professions, or politics; good-naturedly between friends; and bitterly between foes.

The one who would find the way to winning the victories which are worth while and lasting must first find the answer to a few fundamental questions. Does winning mean gaining by virtue of superiority either inborn or acquired? Does it mean to get or obtain something? Does it mean to persuade someone, or to make someone friendly or favorable to you? Or is it synonymous with being successful? The answers to most of these questions and any others having a bearing on the matter will depend upon whether the results are looked upon as being essentially external or internal.

It is not difficult to call to mind numerous common situations in which winning is usually thought of as essential. One has only to think of his favorite game, contest, or sport to arouse very vividly that desire to try it again with the ever recurring hope of winning. He who wins frequently and consistently has learned the secret that winning requires something more than hope. He has further striven until he has discovered what these other elements are and has mastered them.

The contestant in an automobile race cannot expect to win on hope. He must labor to see that his car is in perfect working condition. It must be supplied with fuel, oil, and all the other essentials to first-rate operation. Finally, he must know how to operate it to get the very maximum of performance from it. A campaign for election to office, whether it be public, class, or club, involves the discovery of the essential elements and successful handling of them. In school circles the debate and the athletic contest are the most commonly existent forms of organized effort to win, and in each there is usually a coach to help the contestants discover and master the necessary contributing details. To acquire a good habit is no small victory, and most of the greater things of life are won through an accumulation or combination of good habits. No less a victory is involved in quitting a bad habit. It may be anything from a faulty method of holding a tool to biting the fingernails. Whatever is to be won must first be recognized in the mind, and then pursued with determination.

For and Against

Winning is usually thought of in terms of striving *for* something, but it may be just as truly the victorious outcome of a struggle *against* something. Frequently it is a combination of the two. A nation at war is inspired to fight against the inroads of the enemy in order that the desirable conditions of personal and national life may be won or preserved.

Similarly within the individual there is a constant struggle against something or other in order that a plan may be made for something more desirable. Occasionally an individual is encountered who seems to resist just for the sake of resisting, with no other apparent purpose to be won. Such a person is usually described as being stubborn, and it is always much easier to see such a trait in the other fellow than in oneself.

A more fruitful enterprise consists in fighting against certain things and trying to win against them. Many people use all sorts of devices to fight against ugliness — of face, form, or disposition. Others strive to win against impetuousness and find constantly going on within themselves a figurative race between the tortoise and the hare. Other things which people commonly seek to win against are bad temper, worry, and dishonesty.

Perhaps it is easier to think of winning in terms of what we want rather than in terms of what we want to get rid of, but if such be the case we need to be careful in what we want. Can we really say we have won if we get the bank-night money at a movie, or come into possession of any prize merely by chance? Not if we understand the real nature of winning.

Some of the great winnings of life will be made more certain if some fundamental personal traits have already been won. Seeking to win beauty of spirit or greatness of heart is not a sign of weakness or effeminacy. One may win true dignity without becoming snobbish. To win health is worth the best efforts of anyone. Self-control is a trait which will help in winning a thousand other victories, and there are a myriad of good habits which will work like the parts of a well-oiled machine in accomplishing results in life's complex situations.

One of the most valuable things to have won and to hold securely in reserve as an aid to further winning is a good reputation. In this the true nature of winning can be clearly seen, for a good reputation rarely can be bought, borrowed, stolen, or acquired in any other way than through merit.

Permanency of Victories

Whether it be a good reputation, an athletic contest, or a national conquest which has been won, it will not stay won without constant vigilance. A famous wild-animal trainer once said, "The lion can be captured, conquered, and trained by man but he can never be tamed." His whole performance was attended with constant alertness lest the lions, over whom he had won, would turn upon him and attempt to wrest the victory from him.

Victories great or small are of only two kinds. There are victories over evil, undesirable, or dangerous things; and there are the victories which come through winning good, desirable, or beneficial things. The two kinds of victories are alike, however, in the vigilance which must be maintained to preserve them. The flourishing flower or vegetable garden, or the waving field of grain is the result of a struggle in supplying desirable conditions of soil, fertilizer, moisture and cultivation, and in fighting off blights, insects, and pests. But the struggle must continue through to the end if a bountiful harvest is to be assured.

Constant guard needs to be maintained over foes once mastered to see that they do not rise up again and overthrow us. Just as much do we need to care for the prizes we have won lest they become tarnished. Even the loving cup which comes as the symbol of victory must be polished and relacquered now and then if it is to retain its luster.

Ways to the Goal

The study of history in school is sometimes distasteful to the boy or girl intensely interested in the living events of today and the possibilities of tomorrow. The planners of school curriculums, however, in most fields of education, have realized that the best way to deal with the present and face the future is to take an occasional look at the past. It is the path over which we have come that shows us how directly we have been proceeding toward our goal. If the goal has been indistinct or our attention upon it has wavered, the path we have made will be crooked, but constant faithfulness to a brilliant purpose will keep the path straight.

Such an observation of past performance may serve as an object lesson for effective procedure on the way ahead. It provides the background for planning to meet effectively the difficult physical, mental, and moral situations which are sure to be encountered.

(Continued on page 316)

*Assistant Superintendent of Schools, Minneapolis, Minn.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

John J. Metz, Editor

A Real Boy's Man

America, its youth, especially the boy scouts, lost a real leader and friend on June 11, 1941, when Daniel Carter Beard, National Scout Commissioner, died just before he reached his ninety-first birthday.

He was a man possessed of the versatility of the pioneers who built up our country. As a matter of fact his span of years connects pioneer days with the present, and his list of friends contains the names of many who were prominent in what would now be looked upon as times long past. Among the pursuits which this remarkable man carried on at one time or another, during his long life, may be listed the following: surveyor, map maker, cartoonist, sketch artist, illustrator, naturalist, handicraftsman, writer, and author.

His interest in youth is exemplified by his promotion of the organizations known as the Sons of Daniel Boone, and the Boy Pioneers which flourished long before the Boy Scouts came into existence.

It was fortunate that his enthusiasm was aroused by the Boy Scout movement almost as soon as it was started, and his interest in boys and his natural enthusiasm did much to promote that movement and help it to grow to the eminence which it now holds.

His many friends, especially those connected with the Boy Scout movement, will sorely miss this energetic man who succeeded in packing so much altruism into his own life.

National Defense Training and Industrial Arts

During the fiscal year ending June 30, 1941, over a million trainees were given National Defense Training in the school shops of this country. The schools doing this type of work receive federal aid, and they also receive consideration when the troublesome problem of priorities arises in the ordering of equipment, supplies, and building materials.

All of this is as it should be, since it is vitally necessary that large numbers of skilled and semi-skilled workers be hurriedly trained for the defense industries.

It should not be forgotten, however, that there also are school shops in this country that serve about three and one half millions of youths each year in the industrial-arts courses offered by our schools. This vast number of young people obtain broad foundational experiences in the handling of tools and materials. As a matter of fact, many of the defense trainees found in our school shops today, who have previously had industrial-arts work, can be made employable in a shorter time than those who have had no contact with school shopwork in their earlier school days.

Industrial-arts work, in the light of present-day world experiences, should, therefore, be recognized more than ever before as a highly important factor in the preparation of the future workers of our country. Above all, this work should not be hampered in any way when the need for ordering new or additional equipment, supplies, and the like for inaugurating or carrying on industrial-arts work arises. Preferential priority ratings must be made available for these industrial-arts courses, just as it is done for those school shops in which the work for National Defense Training is carried on.

That this is being done in at least one instance, is evidenced by a letter received from a comparatively small county high school located in Nevada. This school is just starting a shop program, and it has been fortunate enough to receive a preference rating, Priority No. A–1c.

It is to be hoped that Washington will see its way clear to follow this practice of granting preferential priority ratings to industrial-arts shops the country over. While these shops may not be doing actual defense training, nevertheless they are contributing to make American youth more adaptable for many types of semi-skilled and skilled work.

Probably, if school administrators, and especially the large body of industrial-arts teachers, wrote to their congressmen in Washington, and influenced other keymen in their communities to do likewise, something might be accomplished. Dr. William E. Warner of the Ohio State University has already done this in the state of Ohio. His attempts ought to be bolstered up by similar efforts in all of the other states. The promised defense rating of A–10 for schools, will, in most cases, be of comparatively little aid.

Apprentice Training

In these days of frenzied efforts at turning the unskilled into semi-skilled or skilled mechanics, the great value of apprentice training should not be overlooked.

The all-round machinist, the tool- and diemaker, the metal and wood patternmaker, the foundryman, the craftsman and designer, the electrician, the auto mechanic, and the really skilled men in many of the other trades and occupations involved in defense and allied industries, cannot be produced by wishful thinking, the waving of a magician's wand, or a ten weeks' course of specialized training.

The modern apprentice training must still be relied on where youth is to be inducted into a trade that requires an all-round acquaintance with many processes, a knowledge about numerous materials, and the acquisition of skills with many hand and power tools.

The necessity and the stress of the defense training should not be used as an excuse by busy shop teachers for not spending time and effort in leading students, who possess the required gifts of mind and hand, toward entrance into a real apprenticeship course.

This may require a real job of selling, because gifted youth today may easily be led astray by promises of good wages for the few skills he may be able to bring to a useable level with a small amount of training. The real value of acquiring the thorough training given in an apprentice course must be pointed out to these young people, and the advantage of foregoing a little higher wage at the present time for the greater reward in the future must be made understandable to them.

Shop teachers are confronted by a serious duty in thus getting behind the national apprenticeship movement. Both school and industry have suddenly found out that by not stressing the training of apprentices during the depression years, the ranks of skilled labor have been woefully depleted, and that it is imperative that they again be filled and expanded before industry can do all that is expected of it.

INDUSTRIAL-ARTS VALUES

(Continued from page 313)

interpretation of the conventions in drawings and working diagrams, and the ability to express by means of drawing.

The essential experiences in realizing this aim should be the amplification of the ability of the student to read and make drawings, diagrams, charts, maps, sketches, and house plans.

12. To develop in each pupil elementary skills in the use of the more common tools and machines in modifying and handling materials, and an understanding of some of the more common construction problems.

A student has a certain element of pride in being able to construct or build something, such as a playhouse, or a toy automobile, without the assistance of an older person.

These 12 objectives resolve themselves into an orientation program for the junior high school, in which "the student learns the way man lives and earns in an involved technology." Thus, it is seen that by considering the factors of philosophical background, statistical data, adolescent interest, and a thoughtful regard for the established objectives of the industrial arts, we are expanding the junior high school industrial-arts program to one of paramount importance. A well-planned foundation and beginning usually is indicative of a successful culmination of a carefully planned program.

WAYS THAT WIN

(Continued from page 314)

As a nation we face the most critical time in our history in the task of setting forth clearly the things we strive to win against, as well as the things we seek to victoriously preserve. Every individual and every part of our society must help to find the most direct ways to our goals and make every step count toward reaching them. The industrial departments of our schools have long since taught the value of work as one of the ways toward a worth-while goal of life. In this time of intense emergency little modification has been necessary in turning these same departments into effective agencies for defense training.

All departments of the schools have demonstrated the value of study as an indispensable instrument for the individual or the nation who would be best prepared to win. One must play along the way to keep his spirits fit. Leisure time must be profitably occupied, and everyone must have a sufficient amount of sleep — at the right time. Likewise, fresh air and sunshine, and a cheerful mind within help to build the avenues over which we may expect to travel if we would win.

Schools provide the opportunity for the acquisition and cultivation of many of these things, and in so doing are preparing the most substantial ways toward desirable personal and national goals. Democratic society is made up of an enormous network of individuals, each of whom must not only learn how to win himself, but must help others to win. Personal winning rests strongly on knowledge of wherein lie the sources of help, and the willingness to draw upon them when needed. The certainty of a stable and lasting national victory lies in the readiness of its people to give collectively of the strength they have acquired individually. Thus the nation whose people have learned the ways that win the deepest values in personal life, will be the nation that will win in the long pull of generations and centuries.

Problems and Projects

HANDMADE JEWELRY

William T. Baxter,

Woodrow Wilson High School, Washington, D. C.

Jewelry fashioned by hand from sterling-silver sheet and wire, with a minimum of tools and equipment, is fascinating to the average school and home shop worker.

If grinding wheels and polishing equipment are available so that students can grind and polish their own cabochons,[1] the interest is still more increased, for students can then start with stones in the rough, make their own cabochons, and then put them into mountings made by themselves.

[1]Pages 362 to 364, November, 1940, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

Fig. 1. Silver soldering a ring

The tools that are absolutely essential in the making of jewelry are: soldering torch or blowpipe, and asbestos or charcoal block; ring mandrel or tapering piece of round iron; jeweler's saw frame and blades; and an assortment of files, pliers, a hammer, and a buffer for polishing.

Other tools that are very useful are: draw plates, both round and square; draw tongs; dapping dies and block; ring stick; and standard ring sizes.

If artificial gas is available a small *combined* blowpipe like the one shown in Figure 1 can be used. These are inexpensive and students can use this type at home by connecting the torch with a rubber tube to the kitchen stove, removing one of the burners which in most instances can be done quite easily. Individual mouthpieces for such torches are available, or each student, before using the blowpipe, can heat the mouthpiece in the flame of a torch on an adjoining bench and then allow to cool.

Most torches that work satisfactorily on artificial gas do not operate well on natural gas. The Hi-Heat blowpipe, Model D, is an exception and operates perfectly on natural or artificial, Prest-O-Lite, Propane, "Pyrofax," and other gases.

If desired a blower can be attached to the blowpipe. One can easily be improvised from an old vacuum cleaner, using a foot rheostat to control the speed of the motor, thus controlling the volume of air.

Before attempting to solder silver, the beginner should become acquainted with the technique of hard soldering. Practicing an hour on copper wire or small copper strips is time well spent.

Hard or silver soldering is not difficult to master, when one keeps a few facts in mind.

1. The solder melts, according to the composition of the solder, at from 1325 to 1450 deg. F. This is a good red heat.
2. Although the solder has melted and formed a tiny ball it will not flow until the piece of metal, or joint, is heated to the melting point of the solder.
3. Silver solder will not bridge a gap, hence the joint must be tight fitting and the better the fit the better the soldered joint.
4. A small piece of solder should be used. Students are prone to use too large a piece of solder and the excess must then be filed off to make a smooth, neat joint. It is easier to add more solder, if necessary, and heat again, than it is to file off the excess solder after too much of it has been used. Then again, many joints are in places where it is impossible to file off excess solder to make a neat joint.

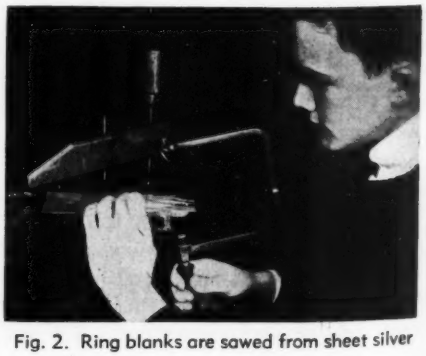


Fig. 2. Ring blanks are sawed from sheet silver

5. A flux must be used to prevent an oxide from forming while the metal is being heated. Common borax and water will work, but this flux has the disadvantage that the borax "rises" when heated and this frequently disturbs the joint or moves the solder.

Prepared commercial fluxes are best because they do not rise. Battern's self-picking flux sold by William Dixon, and Handy Flux, sold by Handy and Harman, New York City, are both excellent. Both of them will remove the oxides around the joint, thus assuring a well-soldered joint.

Fig. 3. Bending the ring blank

Silver solder is available from supply houses in sheet form. Unless this is thin, cut it into strips and roll it down to a thickness of approximately No. 28 gauge. A wide variety of solders for various purposes may be bought in the market, some of which have a silver content which will closely match sterling silver. It may be obtained in a thickness equal to No. 28 gauge, and from 1/16 in. up in width.

Hard soldering is done upon either a charcoal or asbestos block. In soldering bracelets or other large pieces of jewelry, place a piece of charcoal beneath, as well as in back of the piece. The block behind the piece reflects the heat back onto the work.

Place some flux over the clean, tight-fitting joint, and with a pair of tweezers pick up a piece of solder and place it on the joint. Place some flux over the solder. Avoid touching the joint or solder with the fingers as much as possible.

When heating, keep the flame in motion and off the solder as much as possible. The solder will melt and run when the joint reaches the melting point of the solder. A small piece being soldered to a large piece is likely to cause trouble unless one remembers that *both* large and small piece must be heated to the melting point of the solder before they can be soldered together. Direct the flame on the larger piece. If the smaller piece is heated too much the solder will melt and run up onto the piece and not stick to the larger piece.

A brush flame is better than a pointed flame. Practice will enable one to determine the hottest part of the flame. Very little air is required and if the beginner is using the combined blowpipe shown in Figure 1, he should learn to breathe through the nose while still blowing. Satisfactory soldering cannot be done if one has to stop and gasp for breath and then resume the blowing. If one has to stop for breath, for instance, just when the solder is on the verge of flowing, both metal and solder may cool somewhat. If this happens it will be necessary that the piece must be heated to a higher temperature before the solder will flow. This is due to the fact that zinc is used in most silver solder. If heated too much the zinc being volatile burns and the solder becomes hard flowing.

Binding wire (black iron wire) is sometimes used to hold two pieces together while soldering. This should be avoided as much as possible. Careful application of the flame will often prevent pieces from shifting while heating. Never use any bright wire for binding purposes as the solder in most instances will stick to it.

Pit holes in soldered joints can usually be traced to improper or dirty flux, or to the improper use of the torch.

To protect a soldered joint, while soldering another joint near by, coat the first joint with a paste made of water and yellow ochre or water and jeweler's rouge. It is not necessary to cover each joint to protect it before soldering at another place. In the case of a ring, where much soldering has to be done in applying the ornamentation, the solder in the shank joint is likely to run. Instead of using the ochre or rouge over the joint to protect it, place a tiny piece of solder on the joint, inside the ring, at the time the last soldering joint is done. This piece of solder will melt and run down into the joint thus making a well-soldered joint.

Borax used in the flux will glaze on the surface of the piece being soldered. Oxides will also form. These are removed by placing the piece in a copper pan which contains sulphuric acid and water, about ten parts water to one part acid, and heating.

Do not leave the pickling solution in the copper pan but keep in a glass or earthen vessel. Remove the silver article from the pickling solution with copper tongs.

After pickling a piece, examine it carefully to see that all joints are well soldered. If not, resolder at once, and not after the piece is filed and polished.

Silver should be buffed on a muslin buff using jeweler's rouge as an abrasive. Much time can be saved if the piece is first filed and scrubbed with fine steel wool or rough cloth.

The same buff should not be used for both copper and silver. Copper particles will stick to the buff and these in turn will scratch the silver, or sometimes will leave a copper film on the silver surface which must be removed with fine steel wool. After buffing, clean the article with soap and water, scrubbing with a toothbrush if necessary.

Fig. 4. Buffing a ring

To kill the glare of the brightly polished silver, an oxidizer may be used such as Oxifluid, sold by the Metal Crafts Supply Co. Paint it on with a small brush and allow the piece to oxidize. Then polish the spots with a hand buff. Liver of sulphur dissolved in water makes a good oxidizer but its odor is objectionable.

The first step in the making of any piece of jewelry is to make the design. The design is sometimes made using a certain size stone, or stones, as the central ornament. Again sometimes the piece is designed and the stone

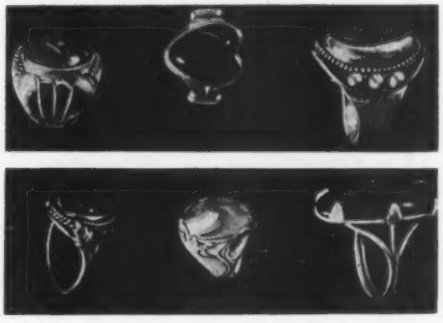


Fig. 5. A variety of rings

or stones cut to the desired size as in Figures 9 and 11.

If a ring is to be made, and a ring of the desired size is available, the ring can be slipped on a ring stick, Figure 6, to determine the size. If the ring is to be made of sheet silver, a paper pattern must be made for the blank. The length of the pattern is determined by using the small scale on the ring stick, measuring from the end of the metal to the desired number or size. Another scale, shown in Figure 8, is sometimes used in determining the length of the pattern where the ring size is known but no ring stick is available.

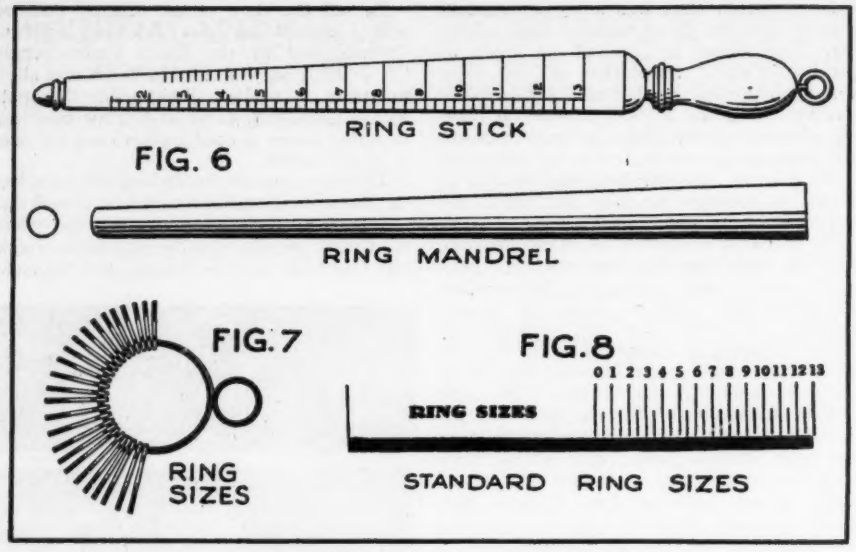
Paste the paper pattern onto the sheet of sterling silver, which may be either 16, 18, or 20 gauge in thickness. No. 16 gauge makes a nice heavy ring, No. 20 gauge a lightweight ring, while No. 18-gauge silver is medium. M-C Glue, sold by the Metal Crafts Supply Co., is an excellent glue for pasting the paper pattern to the silver. This glue holds well and the paper will not curl or come off, although it can be removed readily from the sawed blank by soaking in water.

Saw out the ring blank, following the paper pattern, using a jeweler's saw frame and jeweler's saw blade. The teeth of the blade must point toward the handle of the frame. The blade must be under tension to saw best. Sawing is done upon a notched board, as shown in Figure 2.

File the edges of the blank and then bend to shape. A ring mandrel is very useful in forming the ring. The blank can be partly formed by using a lead block, as illustrated in Figure 3.

A ring mandrel and ring stick, though somewhat alike in appearance, are quite different. The ring mandrel is made of solid metal and is used in forming the ring. The ring stick is made of sheet metal with wood tip and handle and is used for determining the size of the ring and for measuring the length of stock required for the blank.

After bending to shape, test for size and then solder the ends together. It is best to make the ring a half size too small rather



Some necessary measuring tools

than a half size too large, for it can be stretched by hammering lightly while on the mandrel if too small, whereas if too large it must be cut and resoldered.

Make the bezel for the stone. This is usually made of 26- or 28-gauge sterling or fine silver that is about 3/16 in. in width. Make a ring to fit the stone and solder the ends together. Again it is best to make slightly small and stretch to size. Place an inner ring, called a bearing or support, inside the bezel and solder the two together. The bearing, about 24-gauge in thickness, should be about 1/16 or ⅛ in. in width, depending upon the width of the stone being used, and the size of the ring. The wider the stone and the larger the ring, the wider the bearing.

File out the underside of the bezel to fit the curvature of the ring. A piece of emery cloth wrapped around a ring mandrel is ideal for filing the bezel to fit the ring. Reverse the bezel while filing to keep from forming it into a taper, the same as the mandrel.

Solder the bezel to the ring and then make the ornamentation. No. 20-gauge round silver wire, doubled and twisted tightly, makes good ornamentation. So does twisted-square wire and round, or half-round beaded wire. Balls made of silver are often used. Leaves may be sawed out of thin sheet silver, filed, lines or veins cut by using an engraving tool, and the leaf domed with a dapping punch or large nail with rounded end. The dapping is done upon a lead block.

Set the stone after all soldering is completed, the ring pickled and polished. The

Fig. 10. Bracelets like these, made from wire, are worth many times the cost of material

stone should slip easily into the bezel and should not be forced into it. Forcing the stone into the bezel is likely to result in a broken stone. Force the bezel over against the stone with a burnisher.

Rings with wire shanks are made in much the same manner as are the sheet silver rings. First make the bezel and then use two pieces of No. 15- or 16-gauge round silver wire for the shank. Shape the pieces and solder them together. Then solder the bezel to the shank. Size the ring and solder the ends of the shank together and then apply the decoration. A ring of this type is shown at the lower left in Figure 5.

Another type of wire shank is shown at the lower right, Figure 5, where the wires are cut to the correct length and the ends soldered to the underside of the bezel. The bezel in this ring is different from the conventional one used. As will be noted the stone is held in place with leaves. The leaves are made from 20-gauge silver and are soldered onto a bearing the shape of the stone.

Pendants, like rings, can be made from either sheet silver or wire, or a combination of the two. The design should be worked out in detail, full size, and the pieces sawed or bent to shape and then soldered together. The

Fig. 9. Heart-shaped pendants are in vogue

Fig. 11. Bracelet designed and made by high school girl

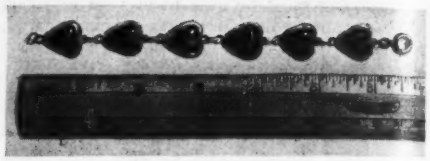


Fig. 12. Bracelet made of matched stones ground by student

pendant shown at the right in Figure 9 is easy to make after one gets the design drawn full size. A bezel is made for the stone and decorated with twisted wire. The outer part of the wire heart is made of No. 14-gauge square wire. It is made in two pieces and soldered together. The inner wires are made of 16-gauge square wire. The pieces are carefully fitted and then soldered together.

Bracelets can be made in a number of ways. They can be made from No. 18-gauge sheet silver blanks that are 5½ or 6 in. long, or heavy wire may be used. The three shown in Figure 10 are made of No. 12-gauge round wire. The one at the left is hinged, and has a handmade catch. The bracelet in the center has three faceted amethysts. The bezels for these stones are held in position with twisted and beaded wire. No. 16-gauge round wire and silver balls are used in the bracelet at the right.

The bracelet shown in Figure 11, with three heart-shaped stones, was designed and made by a girl student. Considerable time was spent in cutting the three stones, two of which are matched, No. 20-gauge round wire was used in making the chain. The bracelet shown in Figure 12 is an example of what can be done with odd-shaped stones.

The brooch shown at the top in Figure 13 was made of 16-gauge round wire. The pin was made of three pieces of No. 12-gauge round wire. This can be varied by using twisted wire, or by using one piece of twisted wire and two pieces of round wire. A stone might have been used instead of the initial on this pin.

Flowers are a fertile source of designs for pins. The whole flower may be cut out of sheet silver, and the petals domed on a dapping block, or each petal may be sawed out separately, engraved, and domed, and then assembled by soldering. The stem on the one in Figure 13 is a piece of 12-gauge round wire. The leaves are cut out of sheet silver. A silver ball instead of a stone can be used in the flower.

The beetle, which was made into a clip, was first designed and a stone cut to the desired size. The paper pattern was pasted onto sheet silver and the metal sawed to shape. A bezel was made for the stone and soldered onto the sheet.

The question is often asked, "Is jewelry making expensive for students?" At the

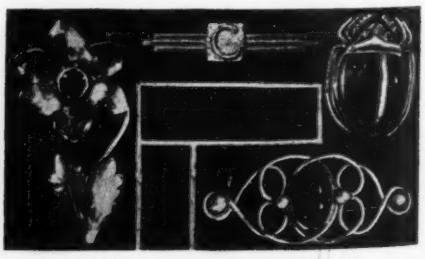


Fig. 13. Brooch, pins and clip

present price of silver, jewelry making is quite inexpensive. Exclusive of stones, rings can be made of wire at a cost of 15 to 30 cents, and of 18-gauge sheet silver, for an average cost of 35 cents.

Stones, if purchased, generally cost more than the silver. They may be ground by students, however, at a nominal cost. The majority of the stones ground in the author's classes cost from 15 to 25 cents for the rough piece of material. These in turn are ground and polished by students into cabochons that would cost from 50 cents to several dollars each in the finished form.

Reference Books on Jewelry Making

Jewelry, Gem Cutting and Metalcraft, William T. Baxter (New York: McGraw-Hill Book Co.), $2.50.

Jewelry Making and Design, Rose and Cirino, The Metal Crafts Supply Co., Providence, R. I. $10.25.

Metalcraft and Jewelry, Emil F. Kronquist (Peoria, Ill.: The Manual Arts Press), $2.25.

Small Jewelry, F. K. Smith (New York: Pittman Publishing Co.), $1.

WALL IVY HOLDER

John R. Rainsford,
Frank E. Anthony,
Erie Technical High School,
Erie, Pa.

An artistic ivy vase or flower holder can be made from a used electric-light bulb and a few pieces of scrap copper.

From a piece of 24-oz. copper, cut out the various pieces as shown in the drawing.

Lay out the design for each piece to full scale on a piece of paper, and paste them on the copper pieces using rubber cement to hold them in place. Use a small blunt chisel to line out the design. When using the blunt chisel, be careful that the tool does not jump off the design line, thus causing blemishes. One or two lines may be chased parallel to the outside edges of the wall piece. The lines may be chased with the same tool that is used for lining out. The space between the lines and the center design may be hammered, using a small blunt tool or a nail set. Drill holes at each end of the wall piece for small screws.

The next step is to make the hook. Repeat procedure described in foregoing for lining out the design. The hook is made up of two pieces. Hammer one side of each piece, and tin the other with a thin coat of solder; bend flanges at right angle to hook and sweat the two pieces together. Drill holes in the flaps to fit the holes drilled in wall piece, and rivet together with ⅛-in. copper roundhead rivets. After the wall piece and hook are assembled, polish them with fine steel wool, and give the assembly a coat of banana oil to preserve the bright finish.

The vase and container is made from a 200-watt light bulb. Paste a piece of gummed tape around the neck of the bulb, just below the thread. Draw a pencil line on the gummed paper. With a three-cornered file, follow around pencil line, score through the paper barely scoring the bulb. To part bulb, touch the scored line with a hot iron.

Shape the collar of 16-oz. copper. Make allowance for the loose fit around the neck of the bulb. Solder the ends together using a butt joint. Drill three small holes, equally spaced, around the collar band ⅛ in. from top edge to fit chain.

After cutting and hammering the strips which form the support for the bulb, tin one side of each strip about 1 in. from the end, then solder to collar. Supports are to be equally spaced around the collar. Polish with fine steel wool and coat with banana oil.

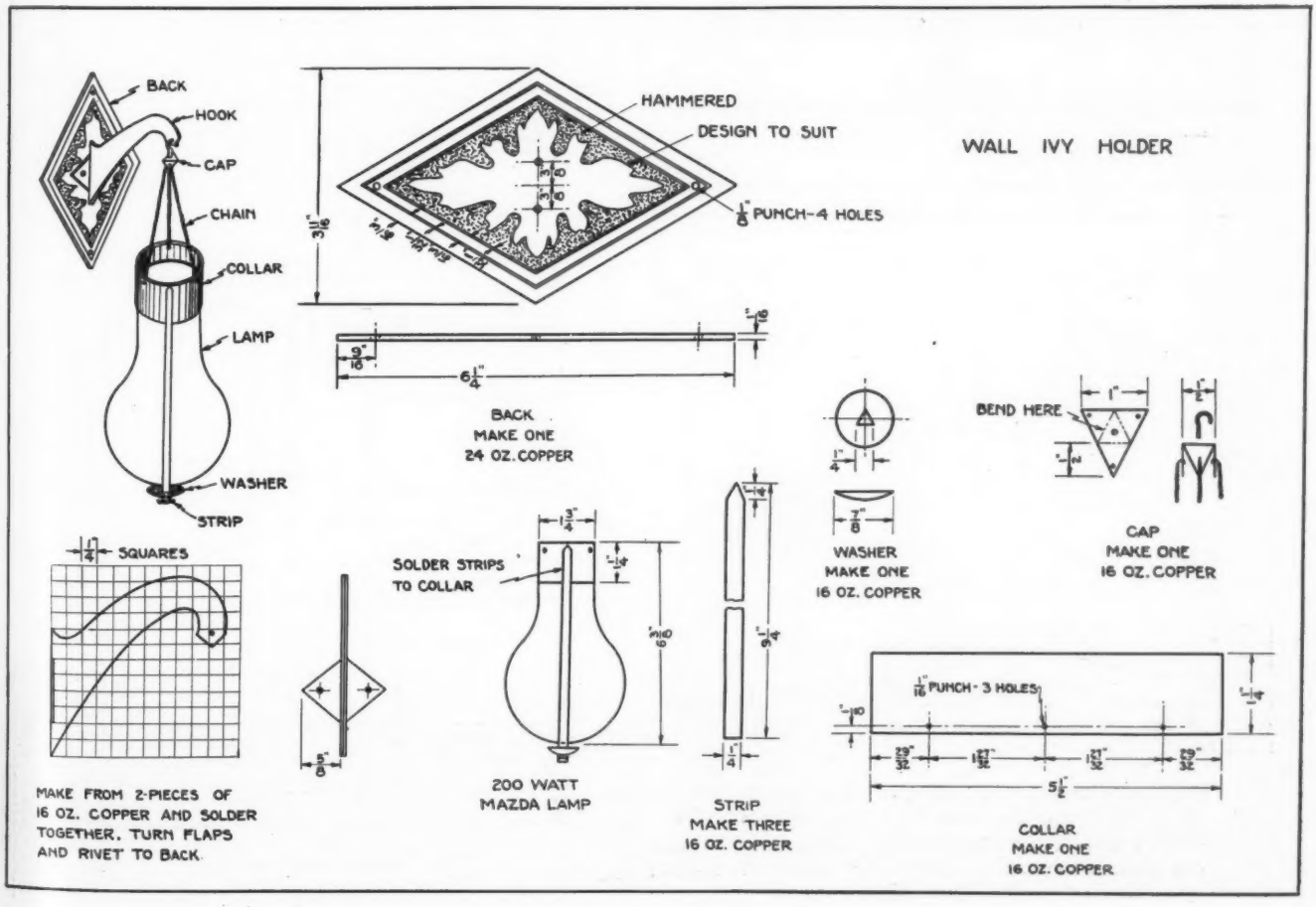
Cut out disk. Hammer and cut out triangular hole in disk.

To assemble, place bulb in collar, bring strips or supports down and slip ends through disk. Allow strips to extend through disk about ¼ in. Turn ends against disk, thus forming a lock to hold bulb in place.

To complete the wall ivy holder, cut small triangular pieces as shown. Drill hole for curtain hook into this piece, solder the hook in place, and bend the triangular piece as shown. Cut three pieces of chain 2½ in. long and assemble.

The man who does things makes many mistakes, but he never makes the biggest mistake of all — doing nothing.
— *Poor Richard*

The reward of one duty is the power to fulfill another. — *George Eliot.*



Details of wall ivy holder

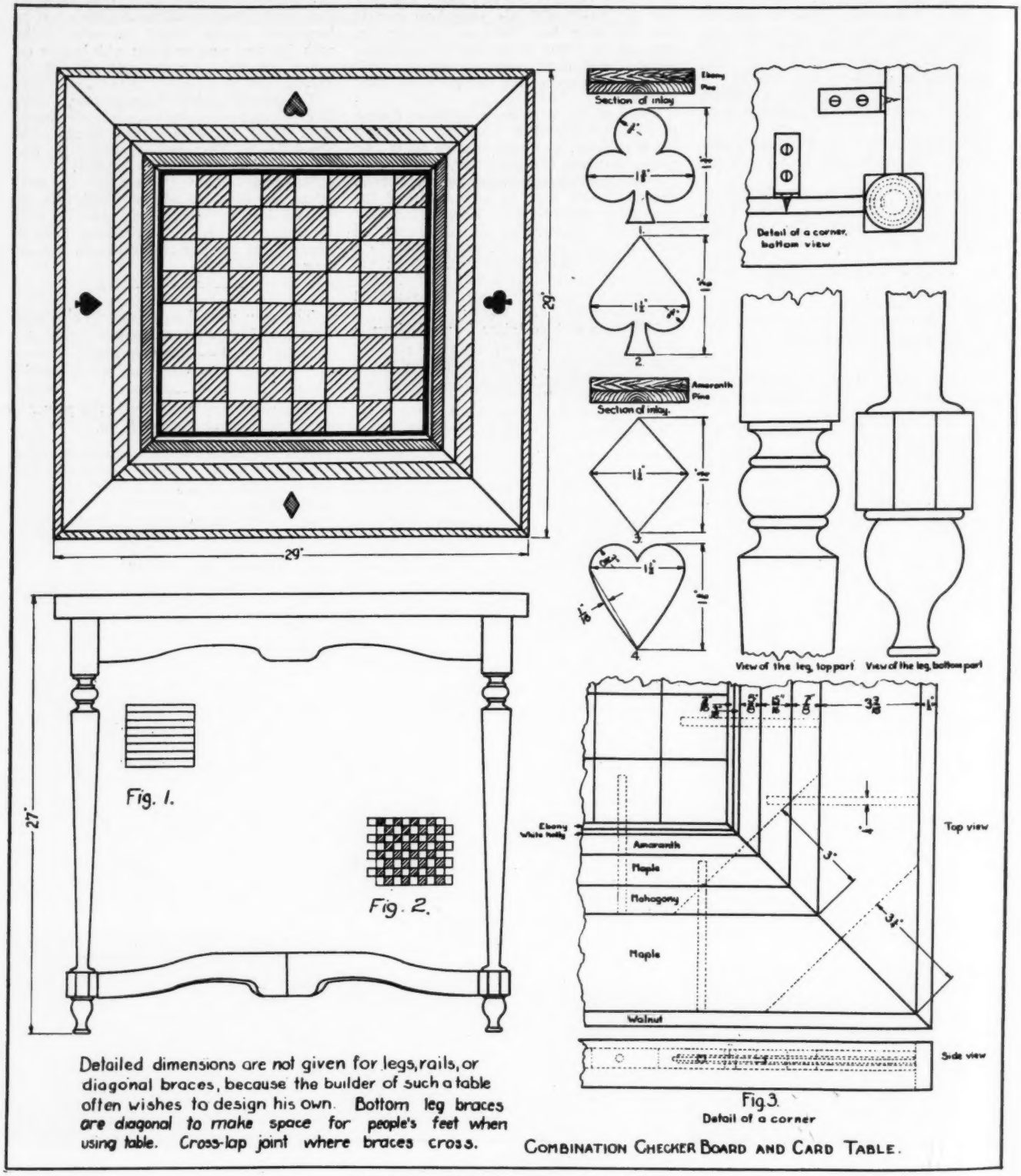
COMBINATION CARD AND CHECKER TABLE

P. L. Brownell,
South Side High School,
Omaha, Neb.

The card and checker table illustrated and described herewith, usually arouses great interest among the students. Not all of them will want to make one, but those who do, feel a real sense of accomplishment after finishing this fine project.

Method of Procedure

1. Cut and finish 4 pieces of maple and 5 pieces of walnut each 1 by 2 by 20 in., as shown in Figure 1.
2. Glue together alternately, being careful to have as nearly a plane surface as possible.
3. Square one end with an edge.
4. Saw out alternate strips across grain, each 2 in. wide.
5. "Size" the cut ends with a thin coating of glue, wiping off surplus.
6. Glue together so that alternate strips are arranged as shown in Figure 2.



Details of combination card and checker table

7. Saw off the projecting maple blocks.

8. Plane both faces to true surfaces. The hand plane is best for this purpose, because the grain is likely to be running in opposite directions on adjoining pieces.

9. Square up edges and ends.

10. Glue up four assemblies of ebony, white holly, amaranth, maple, and mahogany, as shown in Figure 3.

11. True the edges, miter the corners to fit around the checkerboard, fit the dowels, and glue the parts in place.

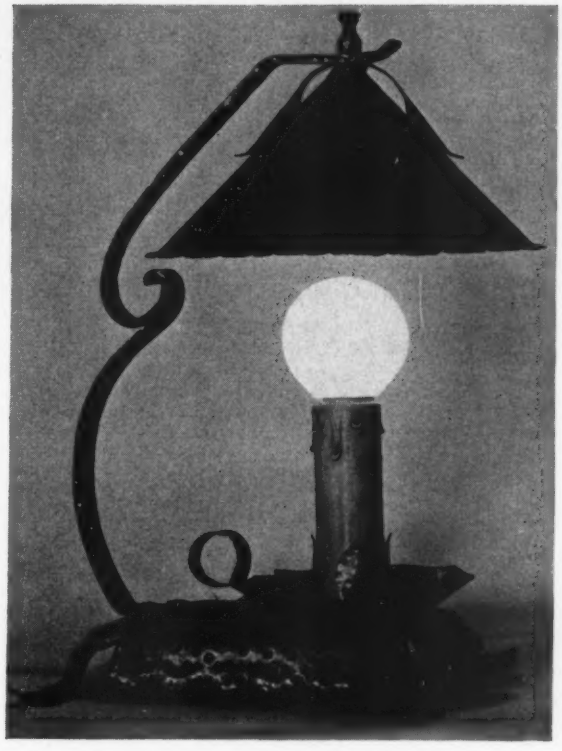
12. After the glue has set, saw groove in each corner ⅛ in. and glue in a walnut "feather."

13. Prepare four maple pieces, 3½ in. wide.

14. Prepare two pieces of inlay stock, one of ebony and one of amaranth. Glue backing of white pine or basswood with grain in opposite direction to that of inlay to prevent breakage.

15. Cut holes for four inlays, deep enough to accommodate at least ⅛ in. of backing on the inlay. Do not taper the holes or edges of inlay very much as this will invite trouble from bulging later.

16. Miter the corners of the inlaid maple boards to fit the rest of the board. Place three dowels in each. Have them project well into the other assembly. Glue in place.



Metal Table Lamp designed by Delmar W. Olson

17. After the glue has set, saw a ⅛ in. groove in each corner, about 3 in. deep, and glue a walnut feather in each corner.

18. Plane the top surface perfectly true. Most of this will need to be done with a hand plane, as the direction of grain will not agree on all parts.

19. Work the other side down so board is of required thickness.

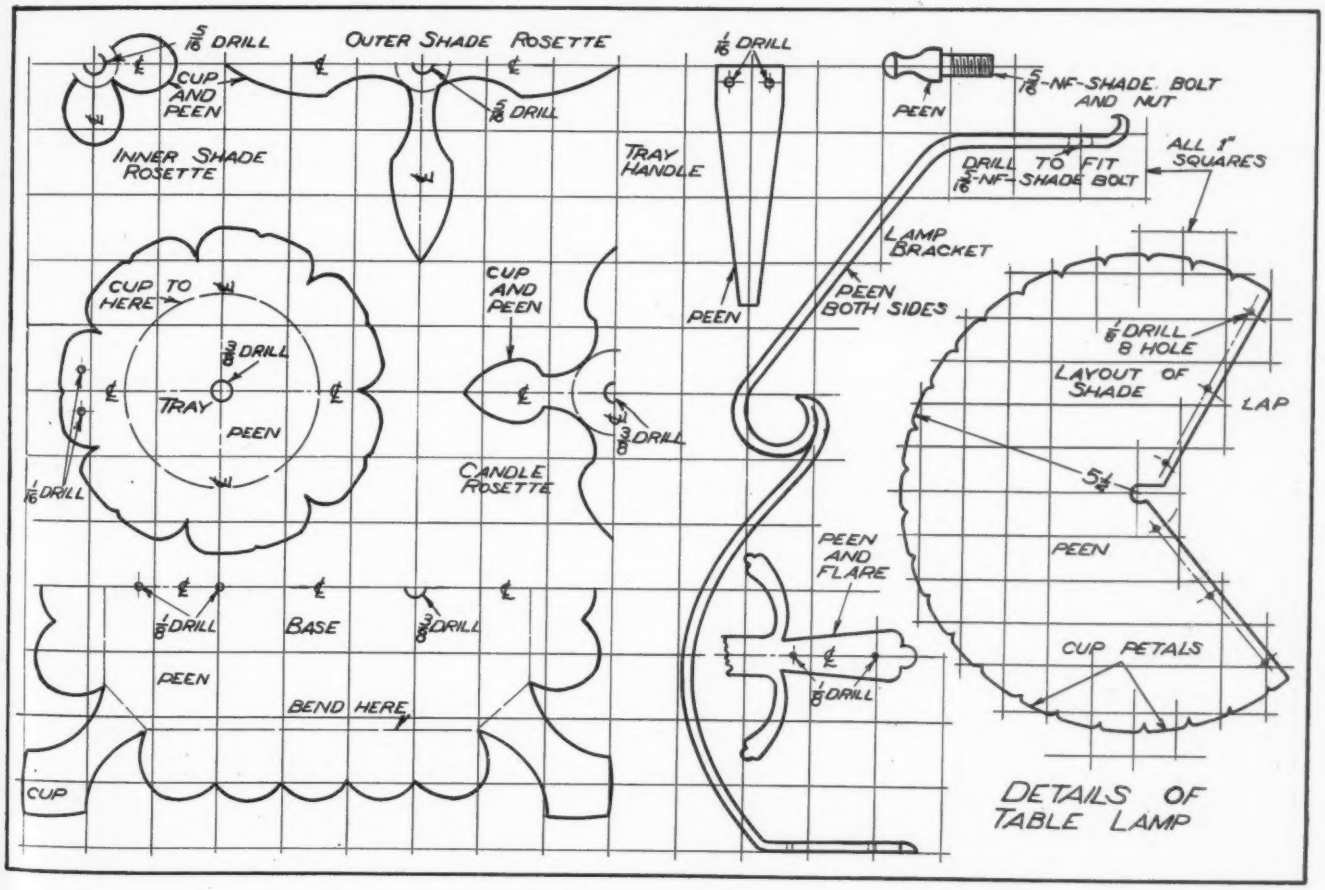
20. To cover dowels and feathers, glue walnut strip around board. Let it project about ⅛ in. above the surface.

21. Apply two coats of white shellac. Sand smooth. Then apply four or five coats of high grade spar varnish, each rubbed down with pumice stone.

METAL TABLE LAMP

Delmar W. Olson,
Supervisor, Industrial Arts, Clinton County Educational Department, Wilmington, Ohio

Revealing the simple beauty of the Swedish blacksmith's art, this table lends itself quite as well to the efforts of the "cold iron blacksmiths." The bill of material, cut to size, is as follows:



Details of metal table lamp

Material	*Use*
1 pc. black iron, 14 ga., 7 by 9 in.	base
1 pc. strap iron, ⅜ by ⅝ by 19½ in.	bracket
1 pc. black iron, 20 ga., 5-in. dia.	tray
1 pc. black iron, 20 ga., 1 by 3⅝ in.	tray handle
1 pc. black iron, 20 ga., 4⅝-in. dia.	candle rosette
1 pc. black iron, 20 ga., 11-in. dia.	lamp shade
1 pc. black iron, 20 ga., 6-in. dia.	top rosette
1 pc. black iron, 20 ga., 2½-in. dia.	under rosette
1 pc. round iron, ½-in. dia. by 1⅝ in.	shade bolt
1 N.C. 5/16-in. nut	shade bolt
2 ⅛ by ⅝-in. r.h. iron rivets	base
2 1/16 by ¼-in. r.h. iron rivets	tray handle
3 1/16 by ¼-in. r.h. iron rivets	shade
Electrical candle with a ⅛-in pipe nipple 1 in. long, and nut to fit.	
6 ft. electric cord, and plug.	

With the material on hand, the first thing to do is to lay out the full-scale patterns for the various members. That done, mark out the base and saw or chisel to shape. Peen all the top surface with the round end of a ball-peen hammer and smooth any rough edges with a file. Curve the four legs over the horn of an anvil or in a U clamp secured in a vise. Check them on a level surface to see if all are touching. Mark and drill the three holes in the base.

Next, make the curved support arm. Peen the iron on both sides and mark with chalk the location of the point of the scroll. Bend the iron double at the mark and hammer out the scroll. Heating the bend in a blowtorch or in a forge will facilitate the forming of the scroll. Split the foot end of the piece as shown with a hack saw or chisel and bend the claws apart. This is also facilitated by heating. Flatten the ends of the claws and then hammer a slight chamfer on the edges. Flare the top end of the iron and curl. Mark and drill the three holes in this piece and then put in the angular bend at the foot, after which rivet it securely to the base.

Mark and cut out the candle tray, its handle, and the rosette. Peen each, but not so extensively as the arm. The hammer dents need not be so close together on the thin sheet-metal parts. Mark and drill the holes. Cup the tray scallops on the anvil horn or over a bar of ½-in. round iron clamped in the vise. Curl the tray handle over a round piece of iron approximately ¾ in. in diameter. A piece of gas pipe will do for this purpose. The rosette leaves can be cupped over the same piece of iron or pipe.

Transfer the patterns for the shade, and cut out the pieces. Peen as you did the tray parts, mark and drill the rivet holes. Form the shade proper by hand and rivet, then cup the scallops over the afore-mentioned piece of ½-in. iron. The top rosette is formed just as that for the candle tray except that the center bend comes at a different place. Drill the hole in the small rosette and cup it to fit the conical shade.

The bolt is ground from a piece of ½-in. stock, the knob peened, and the threads cut. This done, assemble the shade in place.

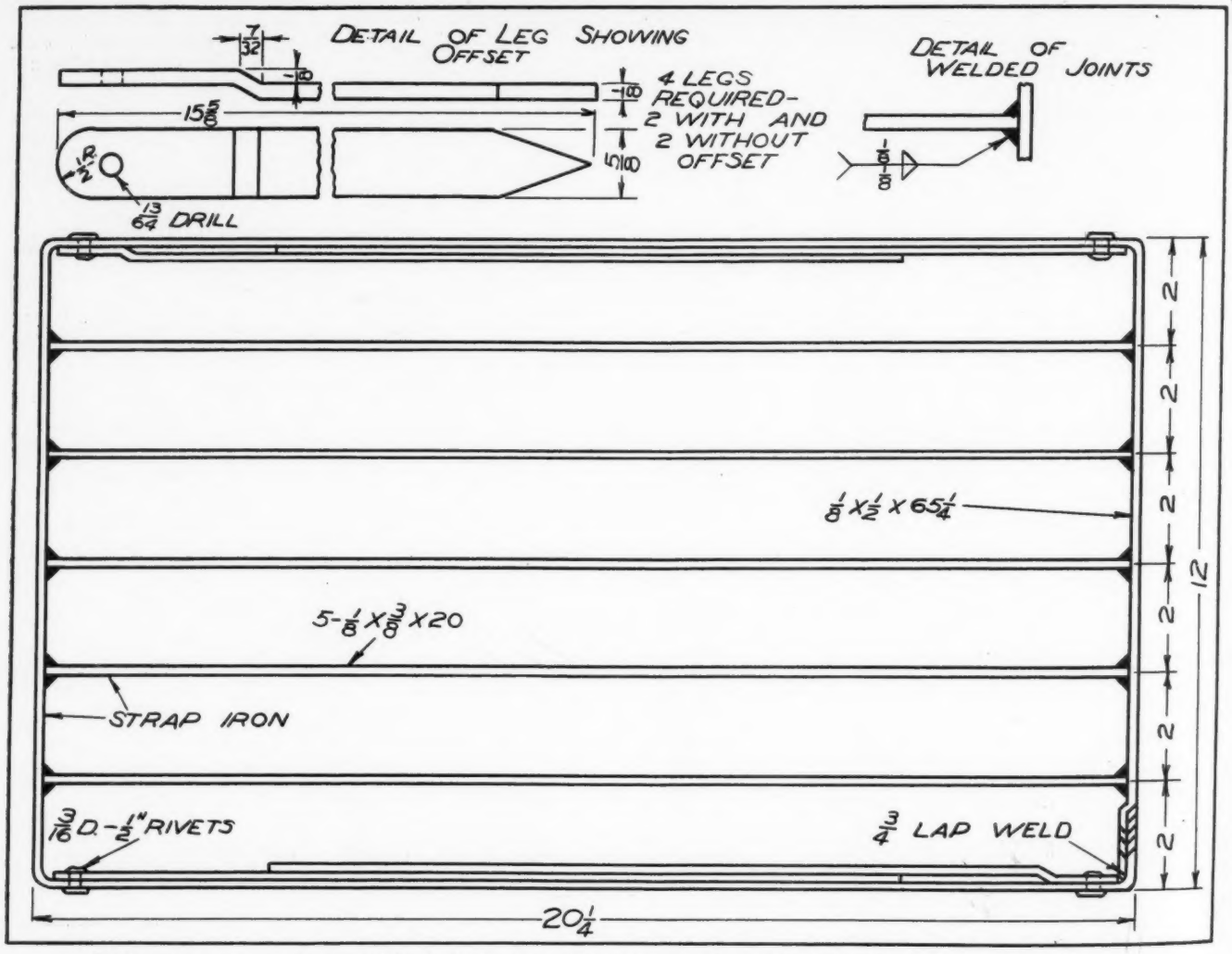
The finish used involves no adulterations, as it were, to the metal. Wipe over the metal thoroughly with a rag dampened slightly in linseed oil, or if you prefer, apply two coats of floor wax.

Insert the electric candle and draw up the nut on the underside of the base, holding the tray securely.

LIBERTY BOOK ENDS

E. Carlyle Lynch, Jr.,
High School,
Lexington, Va.

The book ends illustrated and described herein are interesting and different. As shown in Figure 1 the American eagle is depicted swooping down through the stars representing the 13 original colonies, to attack any enemy of our civil liberties. There is scarcely a home



Folding camp grate — a fine project for the beginner in welding designed by Garrott Barich, East High School, Madison, Wis.

with too many book ends, and so this project will not only be a fascinating project, but a piece of furniture to treasure.

The cost of materials is slight, and the only piece of equipment that might not already form a part of the home workshop is a jeweler's saw, with a deep frame capable of cutting 5 in.

The book ends shown here were made of black walnut and sheet brass, but other and attractive combinations of materials may also be used effectively. Thus, aluminum on natural finish maple will be found strikingly pretty, with a modern touch; brass or copper on mahogany, cherry, or sycamore also are good. As there is little wood in the project, rare woods, as amaranth or East Indian rosewood, with natural, chrome-, or gold-plated metals offer possibilities. Plastics may also be used for making bases, stars, and eagles.

Construction starts with the wood pieces. These are cut and squared to dimensions as shown in Figure 2, and then decorated with the paneled effect either on a shaper or with a portable router, circular saw, or hand rabbet plane. If this latter is used, the sides should be cut first and the ends last to prevent splitting. A shaper with a ¼-in. rounded cutter was used by the author. The top ends should be planed with a very sharp plane taking a fine cut in the squaring process. The corners are rounded with a wood file. The pieces are sanded with No. 3/0 garnet paper, care being taken to sand all arrises, followed by 6/0 paper and then a wash coat of clear shellac. Subsequent finishing operations are, in the case of walnut: light rubbing with a worn piece of 3/0 garnet paper, filling with paste wood filler made chocolate colored with burnt umber, 24 hours drying time allowed, and then from two to six successive coats of thinned clear shellac applied with at least eight hours drying time between coats and each coat rubbed down with 2/0 steel wool. The pieces are finally waxed with ordinary floor wax and rubbed lightly but vigorously with a flannel or some other soft rag.

A pattern must be made of the eagle, a star, and "Liberty." To make a pattern of the eagle, lay off ⅜-in. squares on tracing paper, draw the eagle, as shown in Figure 2, and also a circle to be used in centering the design on the wood. Mark off 13 equal spaces around the circle as centers for the stars. Carbon paper is put between this pattern and a piece of medium-weight drawing paper and a sharp pencil used to obtain a clear image of the eagle. This is now carefully cut out with a razor blade. Use this same method to make

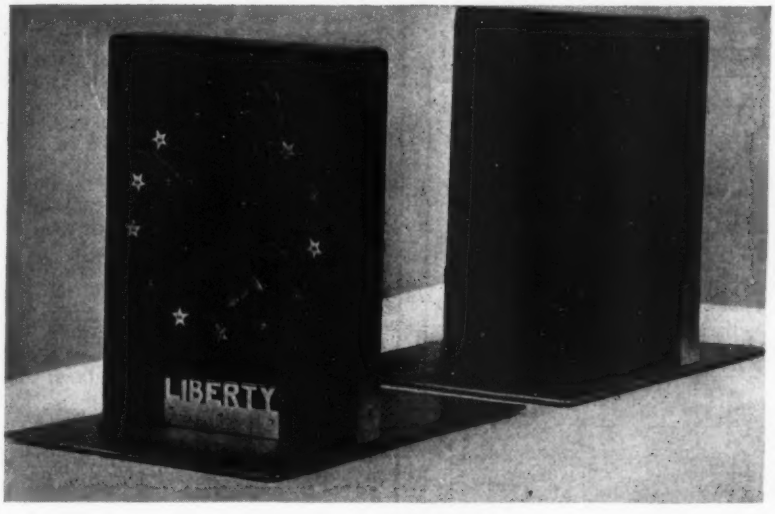


Fig. 1. Liberty book ends

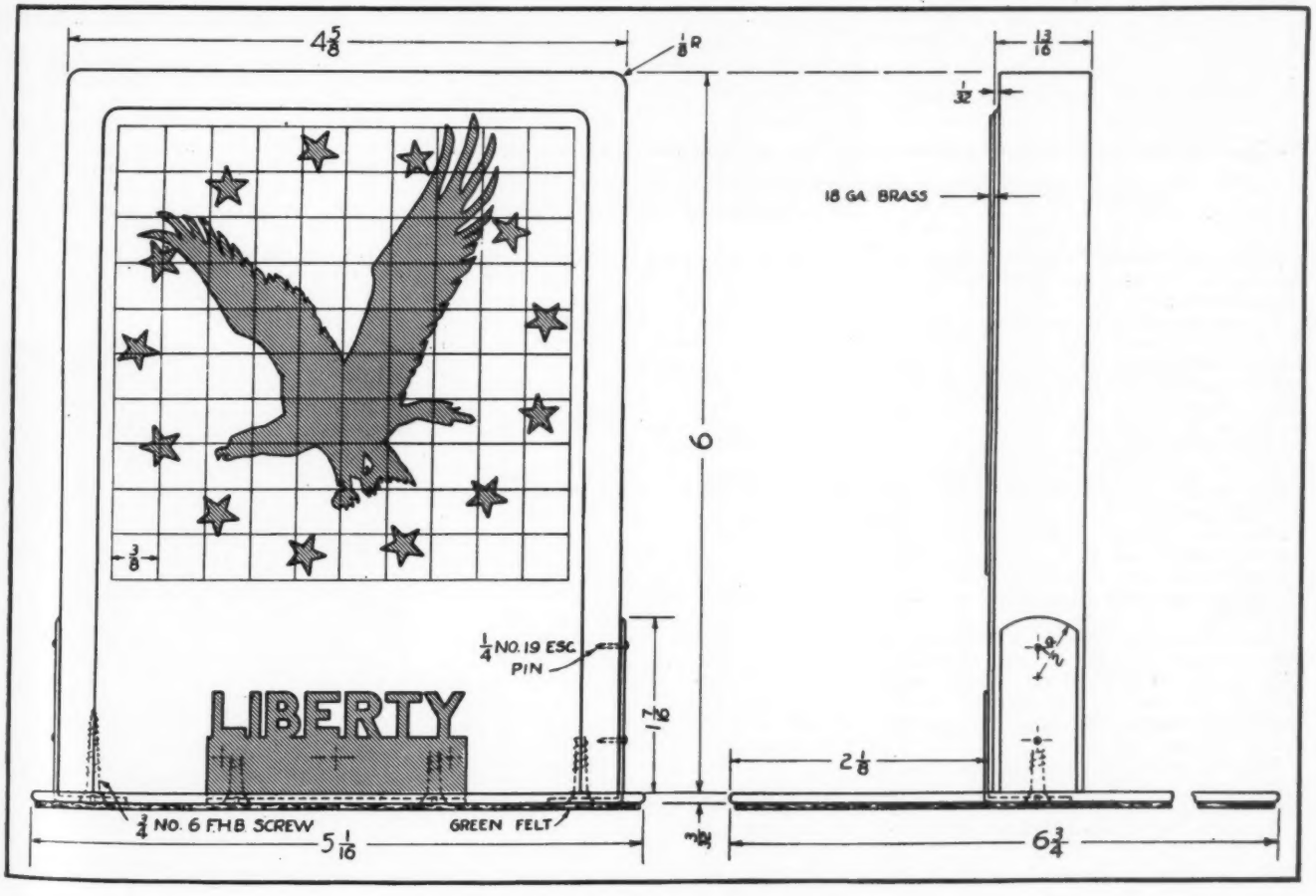


Fig. 2. Detail and assembly of the liberty book end

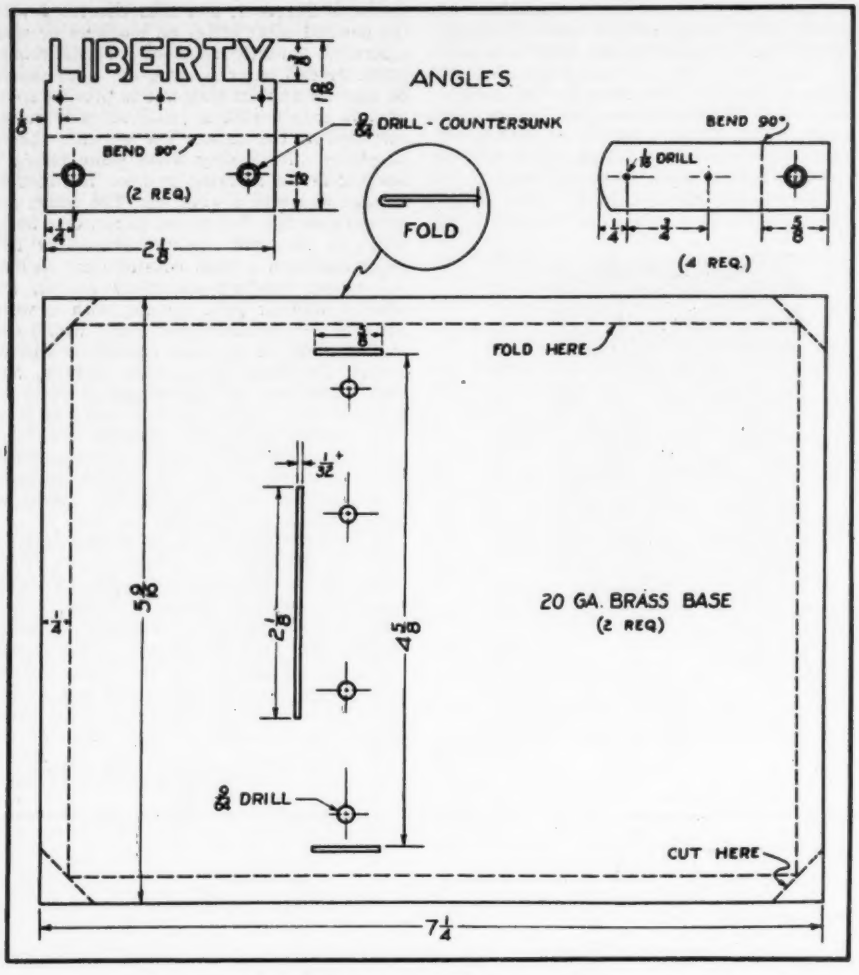


Fig. 3. Details of the liberty book-end base

a pattern of "Liberty." Use the geometrical construction for laying out the pattern for the five-pointed star.

Cut out a piece of 18-gauge sheet brass 3 by 3½ in. with tin snips, beat smooth the edges turned up by the snips — use a wooden mallet — and lay out an eagle on it. In most cases a sharp lead or colored pencil will make marks on the metal clear enough to cut by because of the slight tarnish on most sheet brass. If a pencil will not do, the sheet of metal may be covered with layout fluid and a scriber used around the paper pattern. Two eagles, two "Liberty" angles, and 26 stars are thus laid out and cut from the metal with a jeweler's saw and a No. 2 blade. It is a help to run the saw blade frequently over a cake of beeswax.

The various pieces of metal are fastened to the wood with ¼-in. No. 19 brass escutcheon pins, so that it is necessary to drill small holes in each piece to take the pins. A hole should be drilled in the center of each star before the stars are cut.

The side angles are next laid out and cut from 20-gauge metal and one end rounded. Bend as shown.

The bases are cut from 20-gauge metal with a ¼-in. margin left all around for folding under, as shown in Figure 3. Mark off this ¼ in. all around each piece, miter the corners to allow for folding, and then fold the metal on a brake or by hand as follows: clamp between two sharp square-edged boards on the marked line of each edge in succession, top side up, and beat the metal down flat against the edge of the lower board with a wooden mallet. A metal hammer will stretch the metal. After all edges are bent down, the bases are placed face down on a smooth surface — be careful that the surface is clean so the metal will not be scratched, and fold the edges against the bottom. Care must be taken not to use so much force as to distort the face side when beating these edges down against the bottom.

Lay out and cut the three narrow slots in each base to receive the three braces or angles. A hole is drilled in each end of the slots in which to insert the saw blade.

Then 9/64-in. holes are drilled in the angles and then countersunk for No. 6 by ¾-in. f.h. steel screws. The angles are put through their respective slots in the bases, bottom side up, and the screw holes spotted on the bases. This insures perfect alignment. When the four screw holes have been drilled in each base the angles are again put in place, the bases put against the wood ends, bottom up, and screw anchor holes located on the wood. These holes may be made with a brad awl.

The pieces of metal may be finished in a number of ways, but one of the handsomest finishes is easily and quickly obtained by rubbing the pieces with No. 3/0 or 180-grit emery cloth. Eagles and stars must be rubbed by hand, but the bases and angles may be buffed on a lathe. A piece of emery cloth wrapped around a 3-in. felt-covered drum will answer the purpose. To finish the stars, lay a strip of emery cloth on a flat mill file and, holding a star on it with a finger, rub the star back and forth, using a straight, never a circular motion. This treatment produces a pleasing brushed effect. As soon as the rubbing process has been completed, give the pieces a coat of clear metal lacquer to prevent tarnishing. If the newly rubbed metal must be handled, wear clean cotton gloves.

Now clamp the wood ends in a vise between paper or blotter pads to protect the finish and screw on the bases and angles. Remove from the vise, place on a paper or blotter pad as a cushion, and drive escutcheon pins in the holes provided in the three angles. Place the tracing of eagle and star centers on the wood ends and prick punch the 13 star centers. Fasten the stars on with escutcheon pins. Locate and secure the eagles in like manner. The heads of all escutcheon pins are touched with a brush moistened with clear metal lacquer.

There remains only to glue the green felt pads on the bottom of the brass bases with hide or casein glue.

WROUGHT-IRON LAWN CHAIR

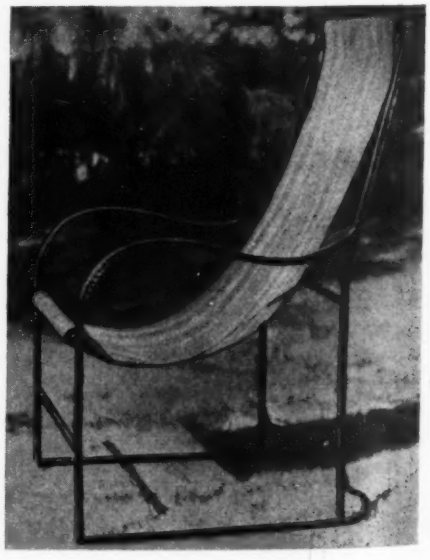
Clyde R. Sutfin,
West Side Union High School,
Los Banos, Calif.

This sturdy garden chair will withstand much hard usage.

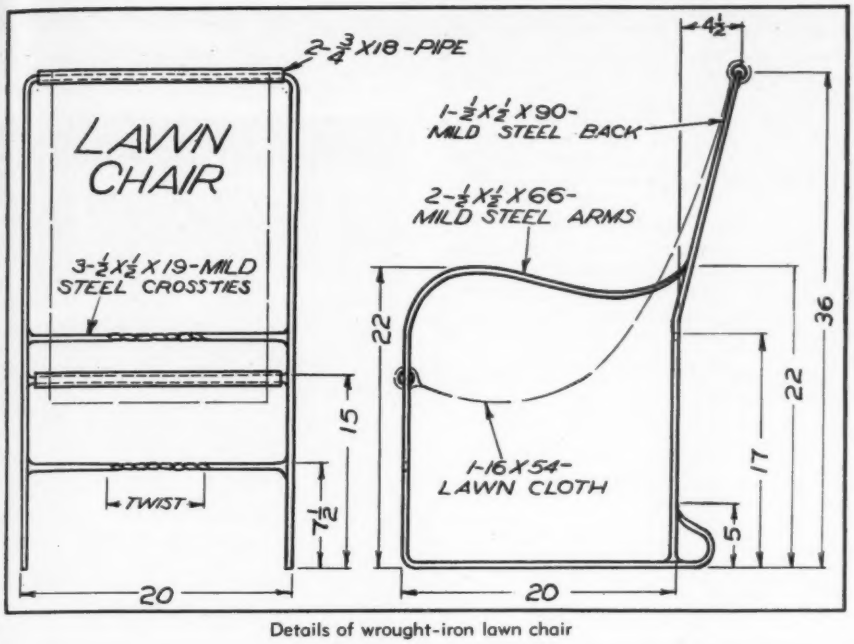
Made of ½-in. mild steel throughout, the curves are easily bent cold to a full-size pattern made of the side view of the chair.

The arm, front leg, and foot is made in one piece 66 in. long. The two back legs are bent from a piece 90 in. long which also forms the upper back of the chair. Before bending this piece, slip on an 18-in. length of ¾-in. pipe and place it in the middle of the bar so that the cloth, when later sewed around this, will not be torn.

The three crossties are 19 in. long, or the



Wrought-iron lawn chair



Details of wrought-iron lawn chair

same length as you have bent the back of the chair. The upper crosstie also has a pipe slipped on for protecting the cloth, and the lower front and back bars have a few twists put in at their center.

The dotted line shows the approximate contour of the cloth when on for an easy rest and should be sewed and the end loops slipped in place on the pipes before welding or assembling the joints. Weld the bottom joint of the back legs first, then stand the chair in its natural position on its feet and weld the arms, then the crossties. If welding is not available, the ends may be flattened and riveted.

If a peened effect is desired on the iron this must be done before bending to the pattern.

Fig. 1. Metal rack for storing long pieces of metal

Finish with two or three coats of clear lacquer to prevent rust and you will have a lawn chair that will serve for many summers.

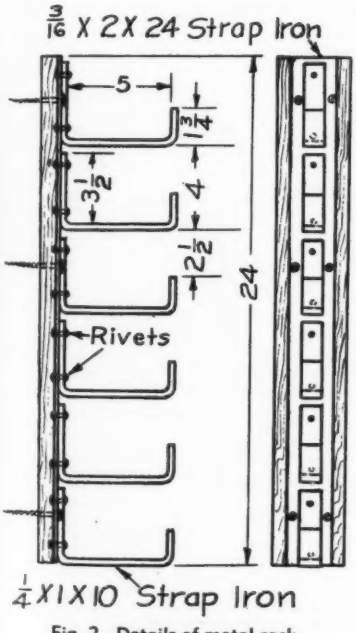


Fig. 2. Details of metal rack bracket shown in Fig. 1

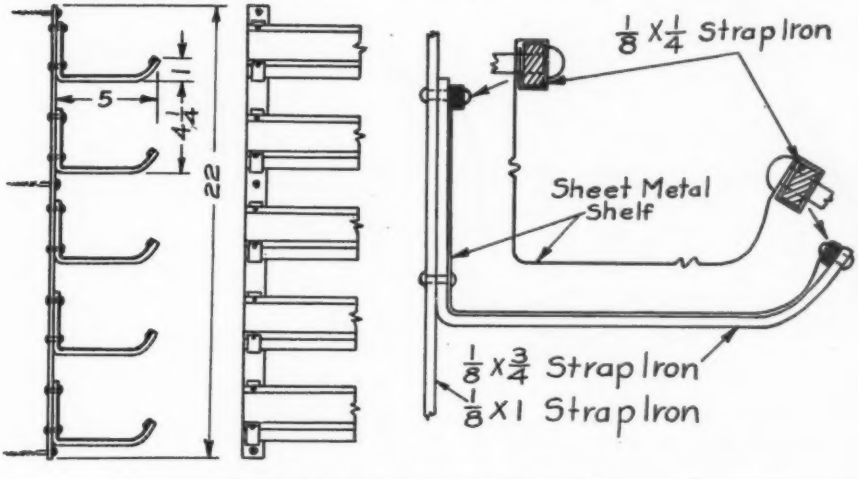


Fig. 4. Details of metal rack shown in Fig. 3

Fig. 3. Metal rack for storing short pieces of metal

METAL RACKS FOR THE SMALL SHOP

Einar E. Siro,
Public Schools,
Minneapolis, Minn.

Metal racks located in out-of-the-way places help considerably in economizing space which is a very important item in the small shop.

Figure 1 shows metal racks fastened to the wall and used to store long pieces of metal in an orderly manner below a bulletin board, blackboard, or on a wall not used for any other purpose. Details of these racks are given in Figure 2.

Short pieces of metal will be used more rapidly if kept sorted as to size and length and placed where they are readily accessible to the students. In Figure 3 is shown a metal rack which has proved very satisfactory for storing short pieces of metal. This rack fastens to the end of a bench or on a wall. Details of construction are given in Figure 4.

PREPARING WOOD FOR FINISHING

William Fawcett,
State Teachers College,
California, Pa.

The home mechanic, after he has spent many hours on a well-planned job, often finds that grease marks and dents have accumulated and marred his work. The handier way to remove spots and dents is not with

the plane. Instead, a cloth or sponge dipped in benzine and rubbed briskly over the spot will soon make them vanish. Then the dents can be raised if the wood fibers have not been torn. Generally hot water is used to raise the dents. A more efficient way is to use a wet cloth and a hot iron. Simply put a wet cloth over the depressions and apply heat with an iron, like pressing a pair of pants. The heat on the cloth creates steam which raises the wood that has been pressed down. When the fibers have been torn, however, steam will not suffice. Stick shellac may then be used to fill the holes.

STAINLESS-STEEL LETTER OPENER

Amos G. Williams,
Professor of Industrial Arts,
Western Union College,
Le Mars, Iowa

The letter opener, illustrated and described herewith, was introduced by the author in a teacher-training class of elementary school art composed of girl students. The simple construction and neat appearance of the project was popular with those students who lacked experience in metal handicraft.

Stainless-steel letter opener

Stainless steel was chosen in preference to sheet brass or copper. Since no coating of lacquer need be applied to prevent tarnishing, it is a desirable metal for a beginning project.

The Tool Processes

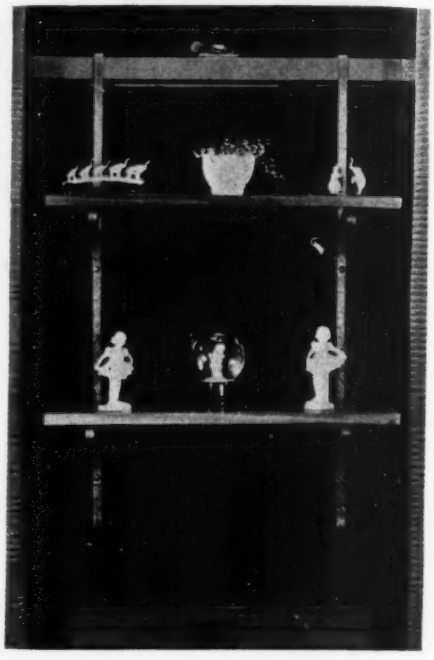
1. The measurement and marking to dimension on 16 to 20-gauge stainless steel.
2. The use of tin snips in cutting the metal.
3. The use of carbon paper or a scriber, as desired, in transferring the design to the metal.
4. The use of trisquare taper files to smooth the edges of the project.
5. The use of a rubber mallet to straighten the metal.
6. The use of a cold chisel, ball-peen hammer, and a very smooth anvil to outline the design on the project.
7. The use of a center punch to stipple the design.
8. The application of abrasive cloth to produce a "brushed finish."

HANGING WINDOW SHELF

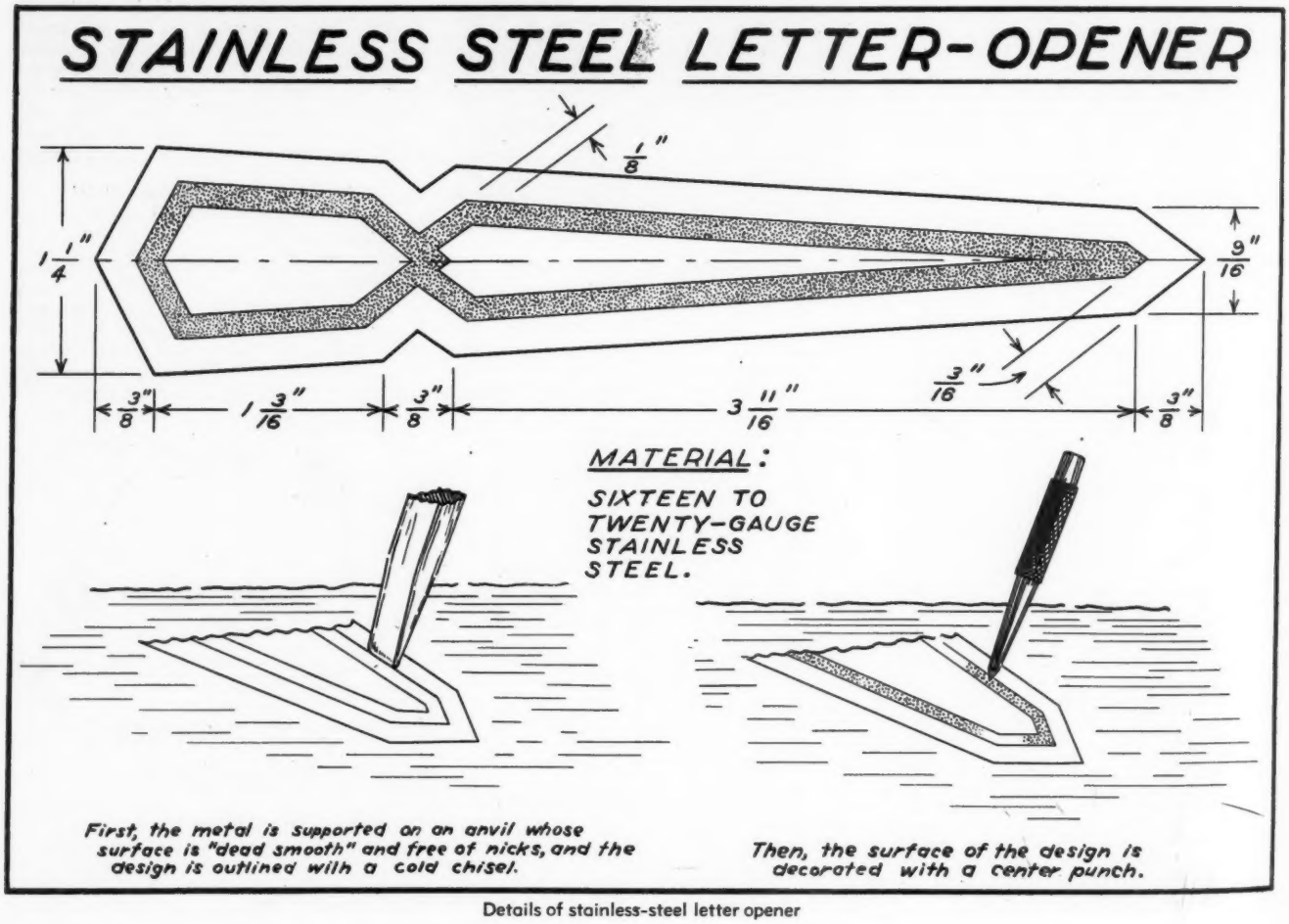
George C. Schultz,
Public Schools,
Carroll, Iowa

The combination wood and wrought-iron hanging shelf described herein has been found to be a very popular project in the designer's general shop classes.

It is simple but involves ample basic tool



Hanging window shelf

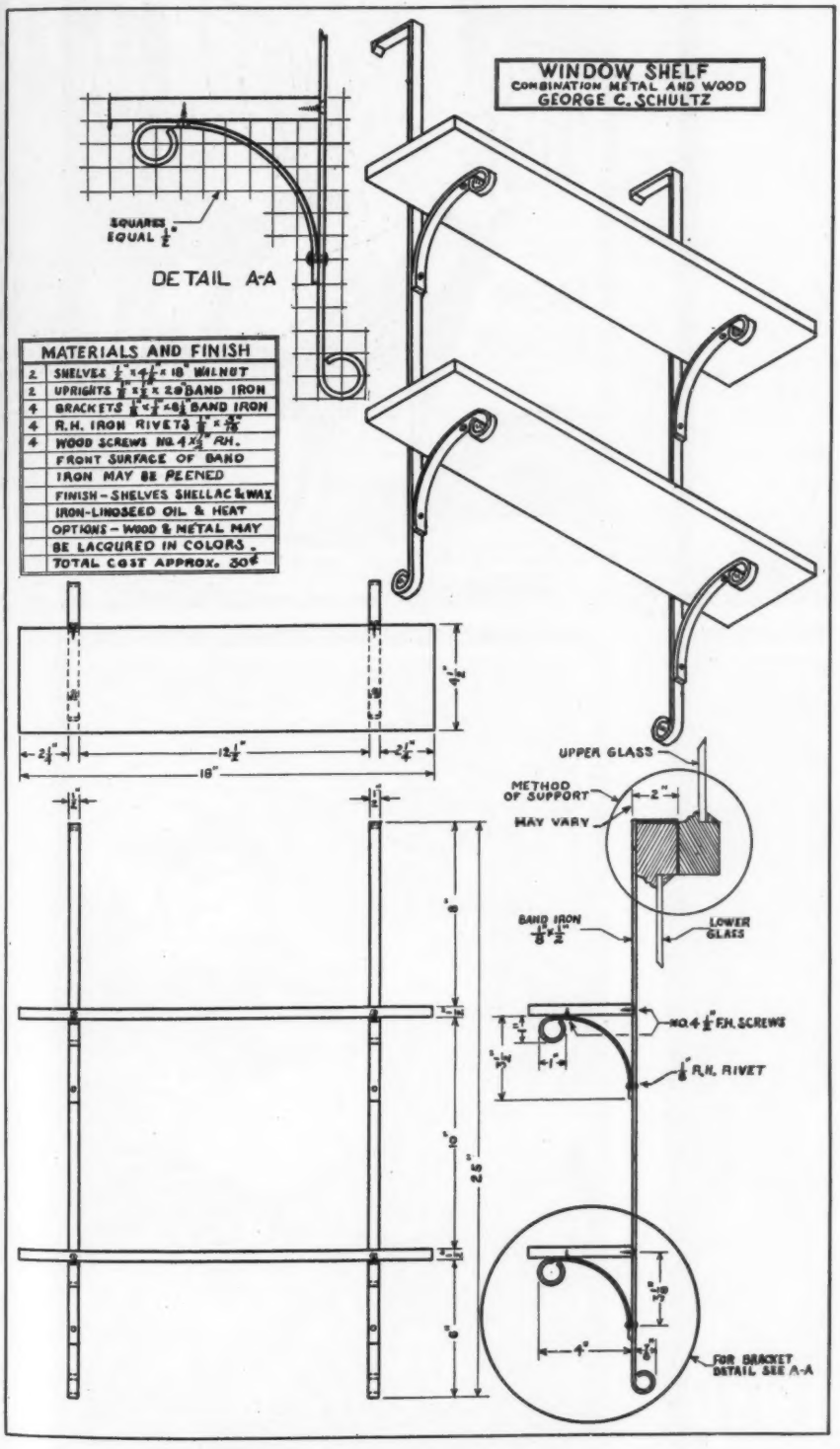

STAINLESS STEEL LETTER-OPENER
1/8"
1 1/4"
9/16"
3/8"
1 3/16"
3/8"
3 11/16"
3/16"
3/8"
MATERIAL:
SIXTEEN TO TWENTY-GAUGE STAINLESS STEEL.
First, the metal is supported on an anvil whose surface is "dead smooth" and free of nicks, and the design is outlined with a cold chisel.
Then, the surface of the design is decorated with a center punch.

Details of stainless-steel letter opener

processes in both wood and wrought-iron work to arouse the students' interest. There is also the possibility of variations in design and finish that appeals to those with more creative ability.

The hanging window shelf not only is popular with the students but with parents as well, since window shelves are currently in vogue.

The shelf may be utilized for holding small potted plants, ornaments, or a combination of both. The writer finds that a shelf with peened metal, and black walnut shelves finished in natural colors, offers a very pleasing effect. The shelf also may be lacquered in plain or contrasting colors. The method of fastening eliminates the necessity of boring holes in the top of the window sash. The material for this project can be purchased for about 30 cents.


WINDOW SHELF
COMBINATION METAL AND WOOD
GEORGE C. SCHULTZ
SQUARES EQUAL 1"
DETAIL A-A
MATERIALS AND FINISH
2 SHELVES 1/4" x 4 1/4" x 18" WALNUT
2 UPRIGHTS 1/8" x 1" x 28" BAND IRON
4 BRACKETS 1/8" x 1" x 6 3/4" BAND IRON
4 R.H. IRON RIVETS 1/8" x 3/16"
4 WOOD SCREWS NO. 4 x 1/2" FH.
FRONT SURFACE OF BAND IRON MAY BE PEENED
FINISH - SHELVES SHELLAC & WAX
IRON - LINSEED OIL & HEAT
OPTIONS - WOOD & METAL MAY BE LACQUERED IN COLORS.
TOTAL COST APPROX. 30¢
4 1/2"
2 1/4"
12 1/2"
2 1/4"
18"
UPPER GLASS
METHOD OF SUPPORT MAY VARY
2"
BAND IRON 1/8" x 1"
LOWER GLASS
NO. 4 1/2" FH. SCREWS
1/8" R.H. RIVET
25"
4"
FOR BRACKET DETAIL SEE A-A

Details of hanging window shelf

BOOKPLATES

May Lillian Lampe,
Weehawken, N. J.

A search through five centuries of bookplates of every civilized nation in the world requires scrutiny of engravings from 1-in. square to full-folio size. The work embraced contains some by unsurpassed artists and engravers, like Dürer, Cranach, Bewick, Hogarth of Europe, and Nathaniel Hurd, Paul Revere, Turner, Henry Dawkins, and Thomas Jefferson of colonial America, and numerous others who have contributed to the *ex libris* world since then. The number of collectors is increasing, but the field is so extensive that no amount of time or money will even approximately complete a collection. Unfortunately, the necessity for having bookplates has lost its popularity today. Libraries in our homes have been reduced to a minimum, and since we have but a limited space, we depend more and more on the lending or public libraries for our reading. Then, too, the bookplates, produced by modern methods of printing, make available to the book lover many sizes and designs ready to paste into his favorite books. Way back in the fifteenth and sixteenth centuries when wood and copper hand etching and engraving by skilled craftsmen was popular, it would have been inconceivable to think of bookplates produced by the mass-production methods of today. However, there are still a few artists, who, with their hand gravers, produce bookplates that can compare very favorably with the finest work produced a few centuries ago.

In the study of *ex libris* a little knowledge of the Latin tongue is necessary, and an appreciation of armorial heraldry, history, art, and philology, for they all have a place in the bookplate world, and while broadly speaking, the pure element of the style of centuries ago has become subsidiary, and the allegorical, symbolical, geometrical, and pictorial unmistakably assert itself today, nevertheless, a study of the development in various directions leading from the little hand-drawn print of 1480 to the process reproductions of our present day will undoubtedly strengthen our education along this line.

Fig. 1. From the original Ex Libris of Hilbrant Brandenburg — 1480
Courtesy of the Metropolitan Museum of Art—Print Department, New York City

Fig. 6. Bookplates by May Lampe

Fig. 2. One of the earliest Italian bookplates — date 1583

Probably one of the earliest European bookplates on record is that of Hilbrant Brandenburg, shown in Figure 1. He was a Carthusian friar at Buxheim, and he presented to his monastery library a large number of books containing these bookplates so that presumably a fairly large number survive. The original was printed in the print shop of Albert Kunne at Memmingen in the year 1480. It was colored by hand in green, red, light yellow, blue, and the background of the shield was in gray.

Albert Dürer was the first artist to raise woodcutting to the level of a fine art. His work is still considered the best and most perfectly adapted to its needs. In 1516 he designed for Ebner a shield and armour and

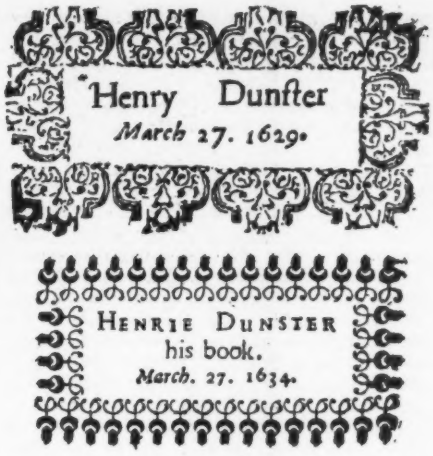


Fig. 3. Two bookplates of Henry Dunster, first president of Harvard. Printed in England. Courtesy of American Antiquarian Society, Worcester, Mass.

in 1524 he did a handsome portrait on copper of Willibold Pirckheimer of Nuremburg, jurist and councilor to the Emperor Maximillian and Charles V, which contained a mixture of armorial and allegorical elements.

Both France and England are credited with producing elaborate and magnificently designed bookplates during the fifteenth and sixteenth centuries.

It has not been definitely established when bookplates were first produced in America. The two bookplates shown in Figure 3, belonging to Henry Dunster, first president of Harvard, dated March 27, 1629, and March

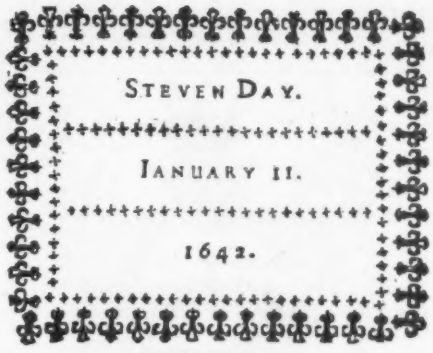


Fig. 4. Probably the first American bookplate. Courtesy of American Antiquarian Society, Worcester, Mass.

27, 1634, are now in the possession of the American Antiquarian Society of Worcester, Mass. These, however, were printed in England. This same society owns one by Steven Day, 1642, shown in Figure 4, which is reputed to have been the first printed here. A John Cotton label of 1674 was probably the first designed here. Most of these plates consist merely of borders embodying conventional motifs.

Many of the early patriots had bookplates. Paul Revere and Thomas Jefferson designed and engraved their own. The signers of the Declaration of Independence each boasted of a fine bookplate.

The outstanding American plate is that of the father of our country, George Washington. This is shown in Figure 5. It has created keen interest in the collectors' world, not alone by reason of the prominence of

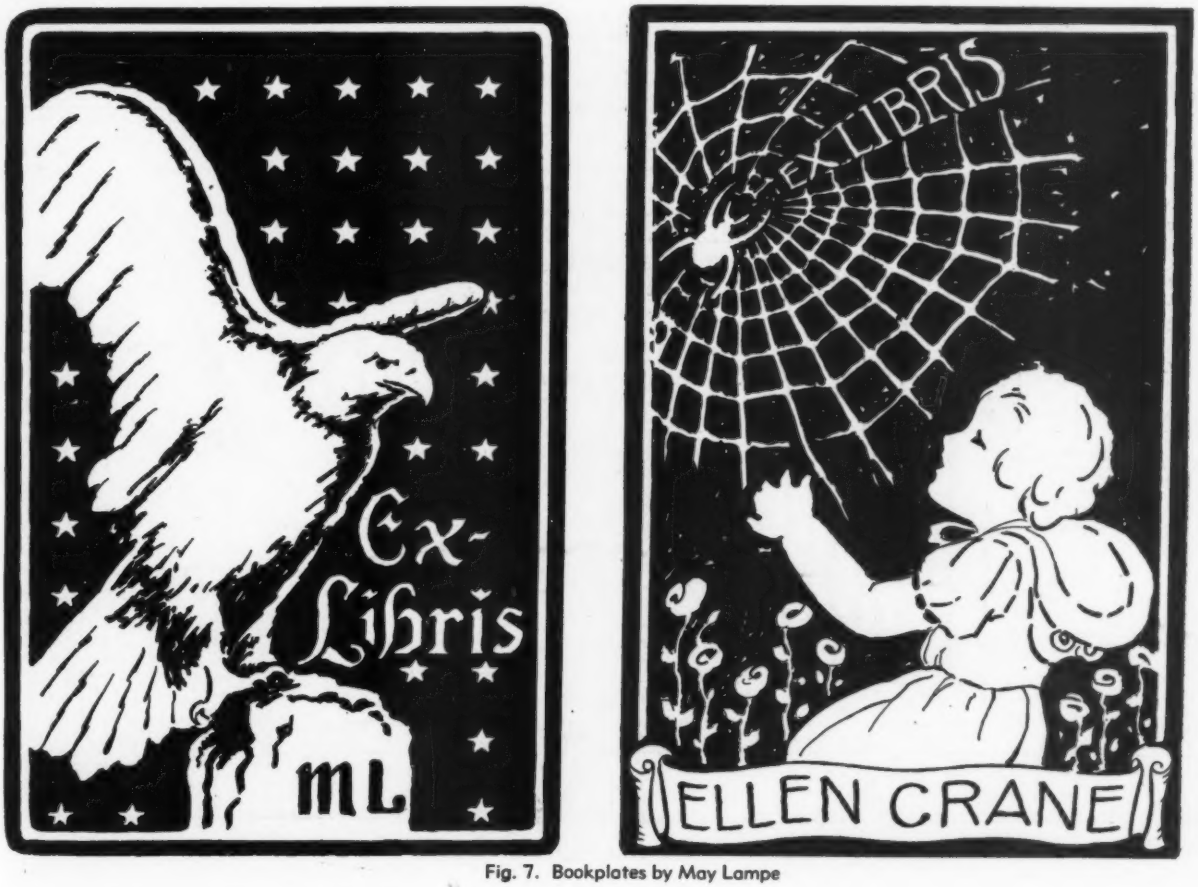


Fig. 7. Bookplates by May Lampe

Fig. 5. From the collection of the Print Department, Metropolitan Museum of Art, New York City. Date — Feb. 1861

the great statesman, but because of the scarcity of the plate. Then, too, it is the only American plate which has been deemed worthy of counterfeiting. There are two French frauds on record. The original plate is thought to be the work of an American engraver, although collectors are divided in opinion.

You can design and cut your own bookplate, one with individuality, for any number of ideas are available. A patriotic idea, the American eagle, or flag, or soldier, the United States capitol building with its gleaming white dome against a black background, or a favorite sport, pet animal, family crest, silhouettes, flowers, trees, perhaps in Oriental design. The popular size runs 3 by 4 in., but variations can be made 2¾ by 3¼ in., or 3¼ by 4⅛ in. — all attractive sizes. Do not forget that the design must be cut in reverse. All of the lettering should be as simple as possible. Trace the finished design onto the linoleum or rubber surface, and start cutting, using the fine veiners for the small spaces and the gouges for the larger areas. Figures 6 and 7 show a number of good examples which may be used as the bases of individual designs.

Paper can be bought gummed for printing these bookplates. Do not try to use more than one impression on a label, but rather decide on hand tinting as was done in the fifteenth century. An outline or key plate is necessary in this case, so that there will be no solid black areas. Many beautiful effects may be obtained with the hand coloring, and the extra effort is well worth while because of the distinctive air your bookplates will possess.

NOVELTY LETTER OPENERS

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Supervisor of Art,
Junior and Senior High Schools.
Newark, Ohio

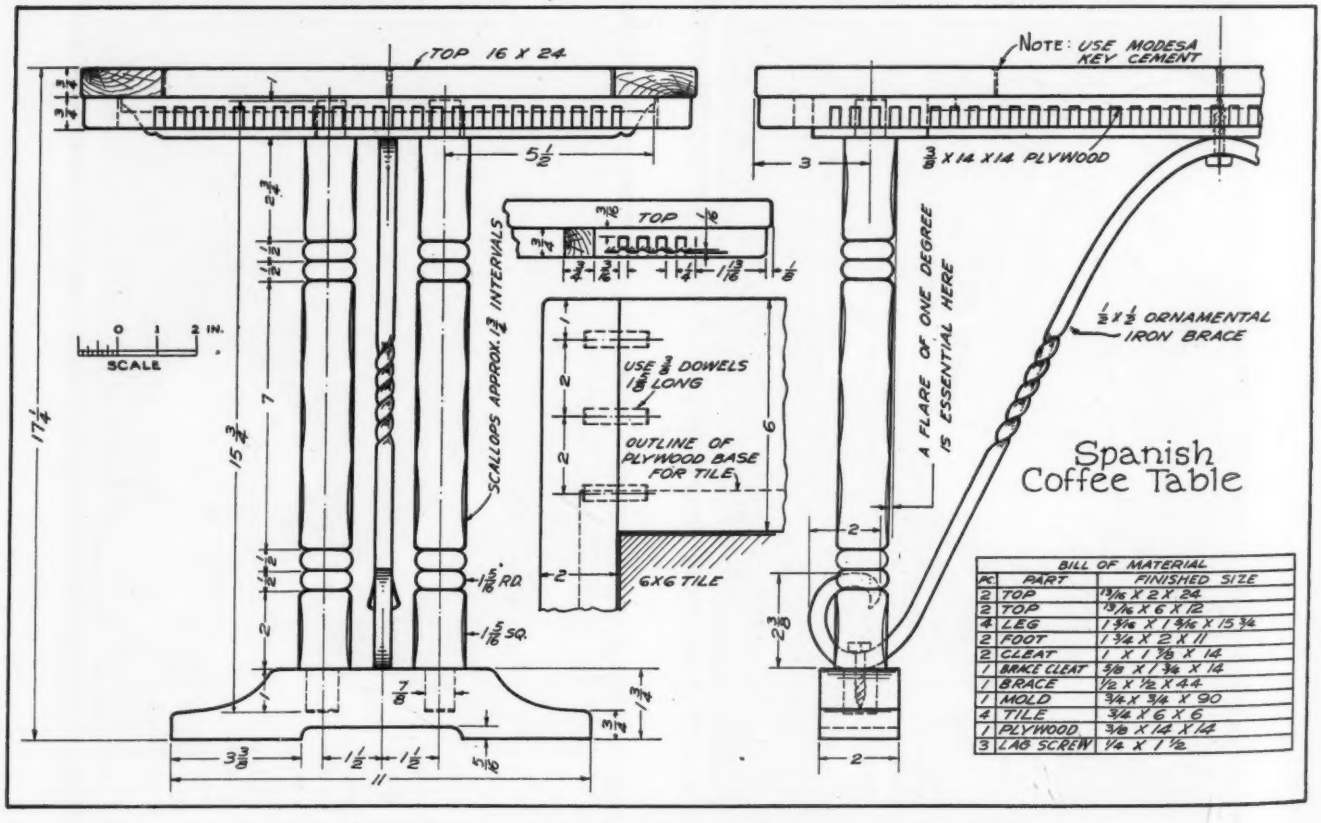
Wood carving has many attractions as a craft problem. It bestows a practical purpose on the pocketknife, which the younger male of the species carries as a badge of manhood. The subject of carving also has untold value in the development of a suitable leisure activity, the promotion of which is part of the responsibility of the modern industrial-arts curriculum.

The letter openers described and illustrated herewith represent attempts to get away from the ordinary, everyday variety. They are writing-desk ornaments designed to function as letter openers. For material select straight-grained wood: white pine, poplar, or cedar. If harder wood is to be used, carving tools may be found desirable to supplement the knife.

To make the elephant letter opener, prepare your true-scale graph by drawing and trace the side view on a piece of wood 2 by 4½ by 7 in. The trunk should run in the direction of the wood grain. Cut out the profile with a jig or coping saw and carve the various features indicated in Figure 1. Leave the delicate parts — the tusks, the trunk, and the tail until last. Since the body of the elephant will be the handle, and the trunk the cutting edge, taper the top of the latter until it approaches the shape of a knife edge, without making it too weak. Test this frequently on folded paper until it cuts smoothly.

The finished carving, with the exception of the cutting edge, may be left rough to show knife marks and shellacked, or it may be sanded and painted in realistic colors. If a painted finish is desired, use a light blue-gray for the body and trunk and white for the tusks.

The tail is used as the cutter on the dog letter opener shown in Figure 2. This is made out of a block of wood 1½ by 4½ by 8½ in. Make certain that the wood grain runs


TOP 16 X 24
NOTE: USE MODESA KEY CEMENT
3/8 X 14 X 14 PLYWOOD
TOP
SCALLOPS APPROX. 1¾ INTERVALS
USE ⅜ DOWELS 1⅝ LONG
OUTLINE OF PLYWOOD BASE FOR TILE
6X6 TILE
A FLARE OF ONE DEGREE IS ESSENTIAL HERE
½ X ½ ORNAMENTAL IRON BRACE
SCALE 0 1 2 IN.
Spanish Coffee Table

BILL OF MATERIAL

PC	PART	FINISHED SIZE
2	TOP	13/16 X 2 X 24
2	TOP	13/16 X 6 X 12
4	LEG	1 3/4 X 1 3/16 X 15 3/4
2	FOOT	1 3/4 X 2 X 11
2	CLEAT	1 X 1 7/8 X 14
1	BRACE CLEAT	3/8 X 1 3/4 X 14
1	BRACE	½ X ½ X 44
1	MOLD	¾ X ¾ X 90
4	TILE	¾ X 6 X 6
1	PLYWOOD	3/8 X 14 X 14
3	LAG SCREW	¼ X 1½

Submitted by William S. Sherinyan, Benjamin Franklin High School, Los Angeles, Calif.

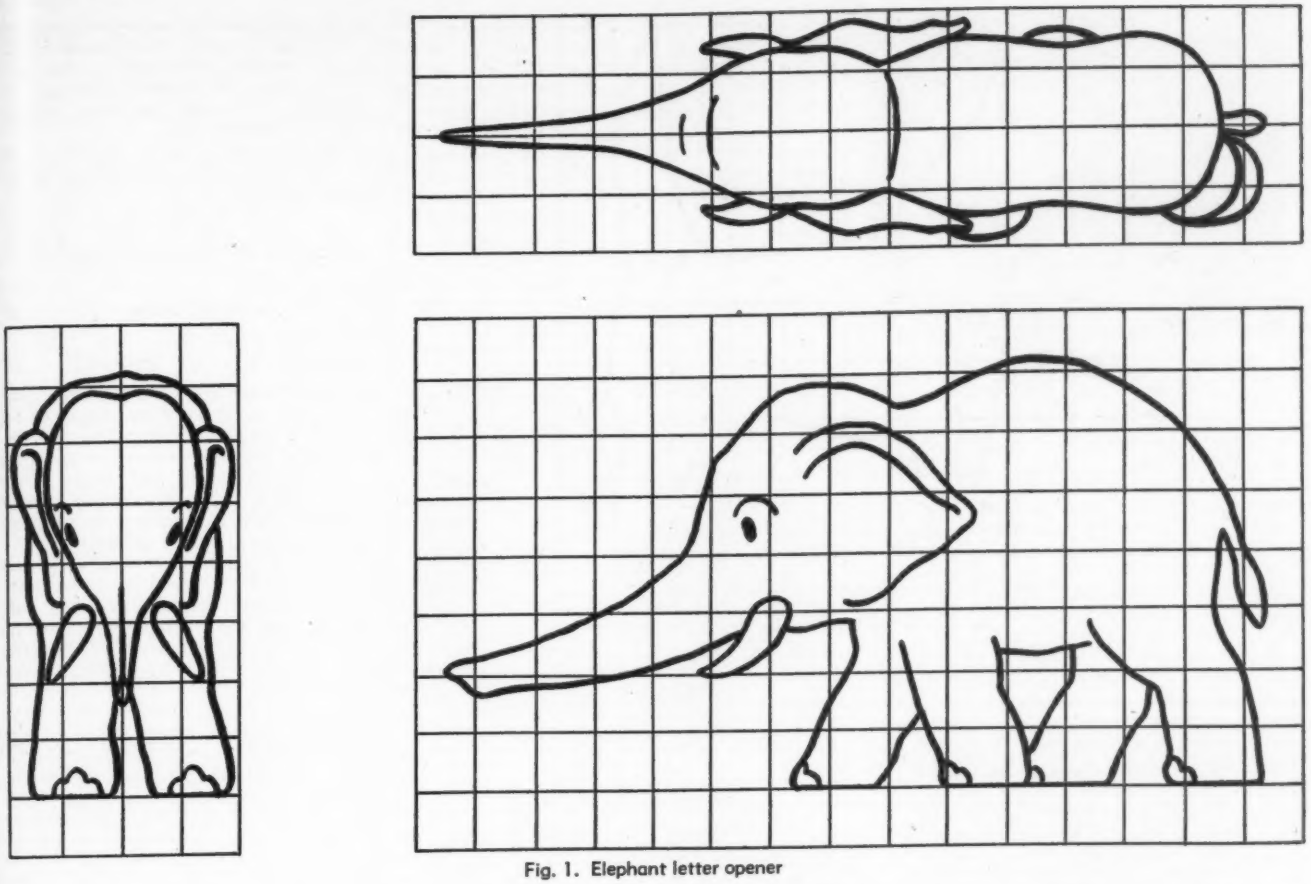


Fig. 1. Elephant letter opener

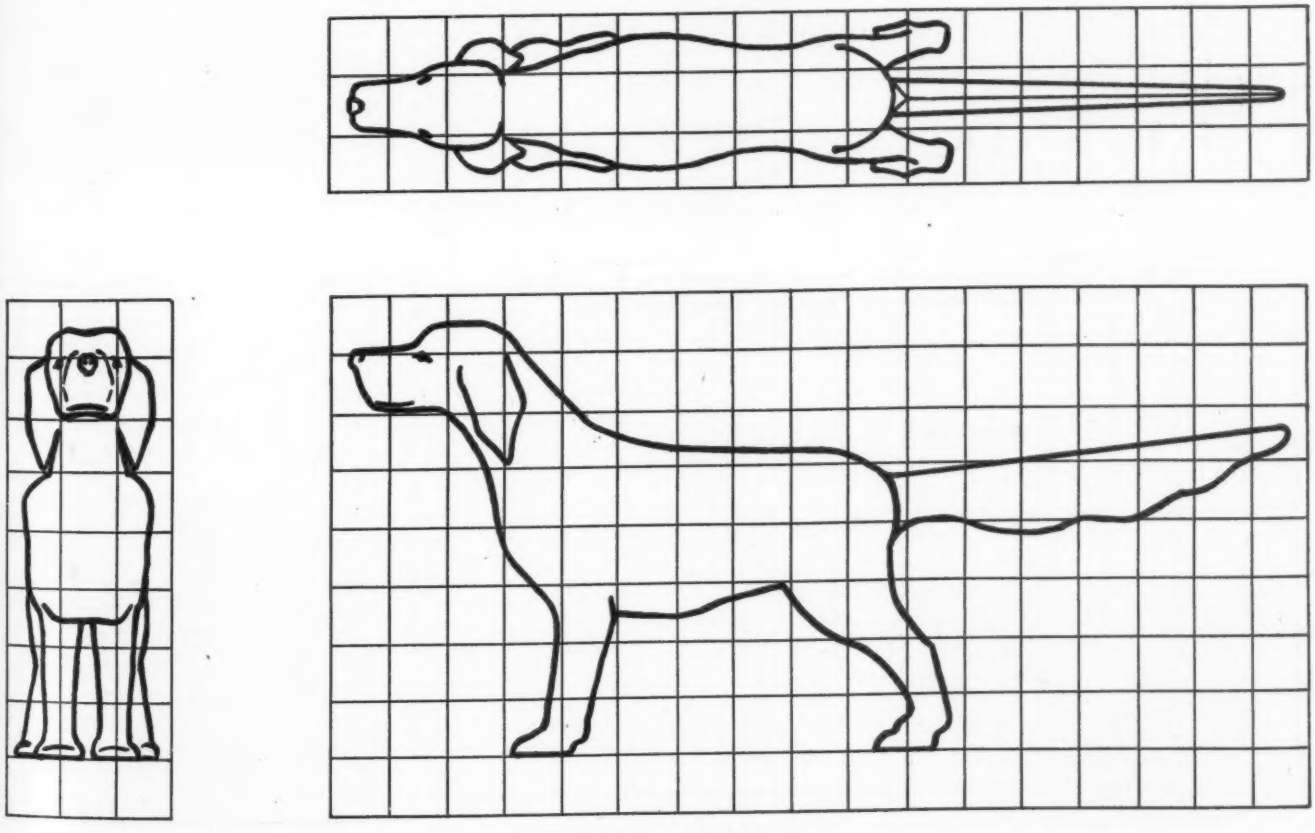


Fig. 2. Hunting dog letter opener

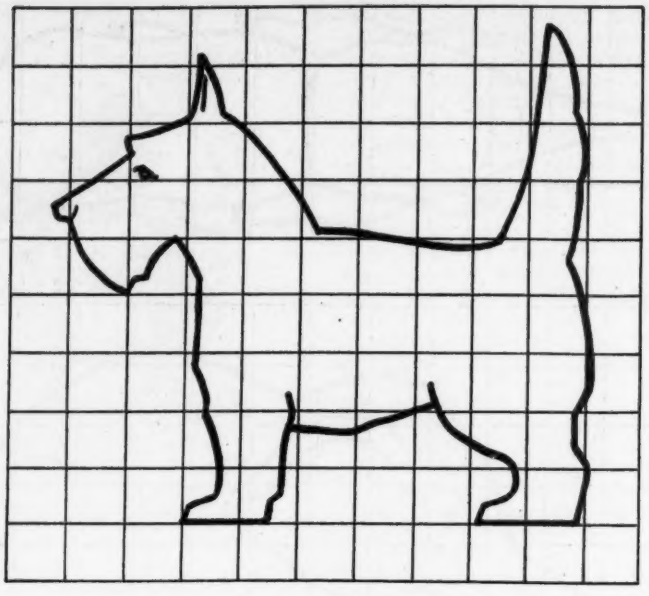
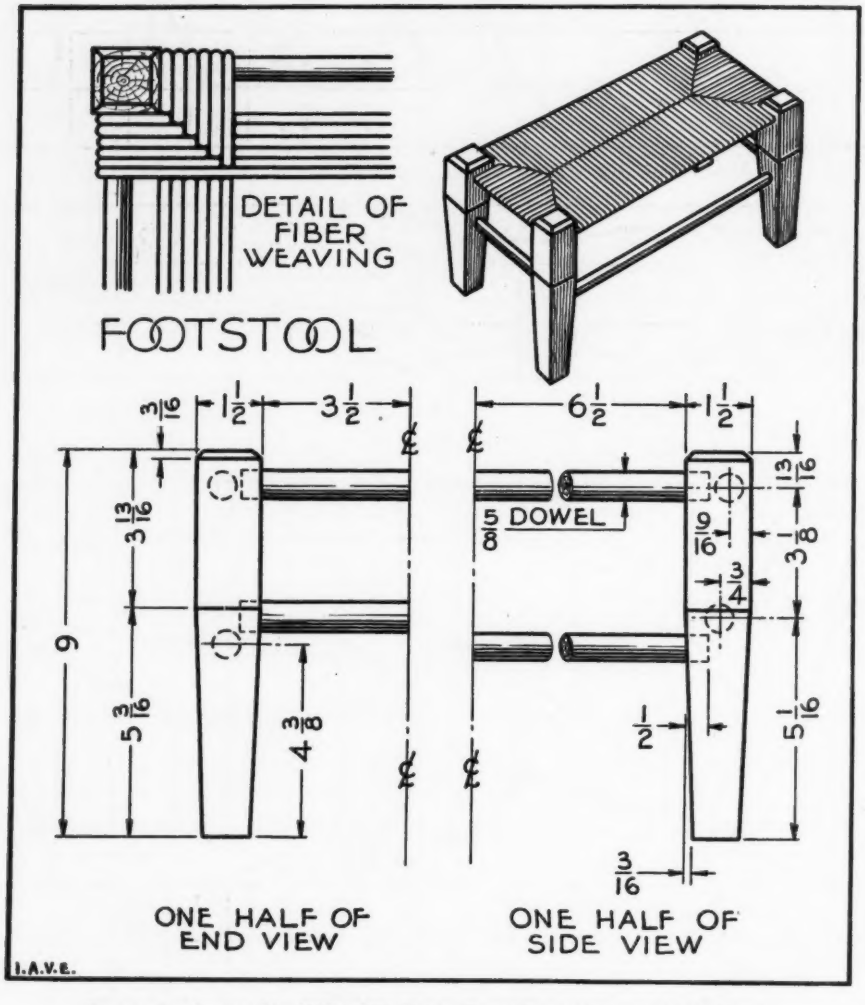


Fig. 3. Scottie letter opener



Footstool, submitted by Willard H. Davis, Tourtellotte Memorial High School, North Grosvenordale, Connecticut

in the direction of the tail when the prepared drawing is traced. The procedure for cutting and carving is the same as that employed in making the elephant letter opener. On this opener the upper portion of the tail is given the knifelike edge.

Another idea for a letter opener is the Scottie, whose tail fulfills the function of the knife edge.

RAISING A FLUTED BOWL

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State Normal School,
Oswego, N. Y.

The fluted bowl makes an unusually good project for the beginner in metalwork or for the teacher to use for demonstrating the common processes that are involved in making a wide variety of bowls and trays. These processes include raising, planishing, fluting, and scalloping as well as many minor processes common to other art-metal projects.

Raising is a process which is sometimes considered too difficult for beginning students. The type suggested here, however, is easy enough for even the beginner in metalwork. In fact, it is possible to raise an attractive bowl in a short time if the following suggestions are used.

During the raising process the metal should not be beaten with a hammer on a steel stake. This hardens the metal considerably and retards the raising process. Instead, when a hammer is required, the sandbag or wood stake should be used, as shown in Figures 3 and 4, and when a steel stake is needed the metal should be shaped with the mallet, as shown in Figure 5. Reserve the

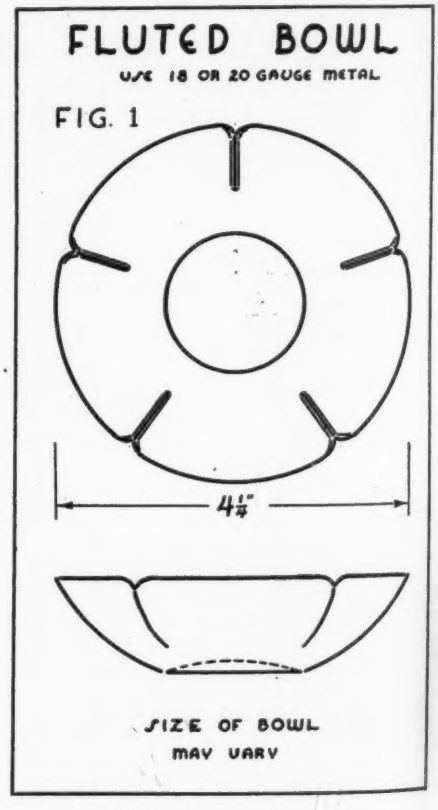
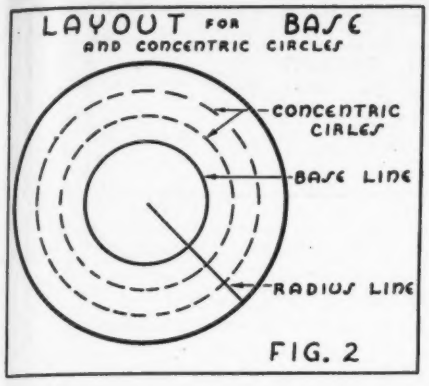


Fig. 1. Fluted bowl (working drawing)



Layout for base, concentric circles and radius line

hardening for the planishing process so the bowl will be stiff and strong when finished.

The stakes and hammers that are used must be highly polished and free from scratches. Each mark on the tool leaves a similar blemish on the work at every stroke.

Much of the equipment used can be made in the school shop. The mushroom stake shown in Figures 5, 6, and 7, can be turned on an ordinary engine lathe. The hardwood

Fig. 3. Starting the raising process

block in Figure 11 is a jig made to fit the bowl. It has a groove to fit the desired flute. It is possible to use a wooden block with a circular depression in the top in place of the sandbag shown in Figures 3 and 4.

Figure 1 shows the size of a finished bowl that makes a very good demonstration piece because it takes a relatively short time to complete. Since the raising process decreases the size of the disk, one should start with a

Fig. 4. Raising near the edge

4½-in. disk to make the bowl shown in Figure 1. The processes are the same for any size bowl, therefore the bowl can be made as large as desired. Many different metals lend themselves readily to this type of treatment. The most commonly used for school-shop purposes are copper, aluminum, pewter, and Eraydo or Garalloy in 18- or 20-gauge thickness for the smaller bowls and 12 to 16 gauge for the larger ones.

Laying out: Lay out the line for the base on both sides of the disk with the dividers. The size of the base should be proportioned according to the principles of good design. Scribe several concentric circles between the base and the outer edge as shown in Fig. 2.

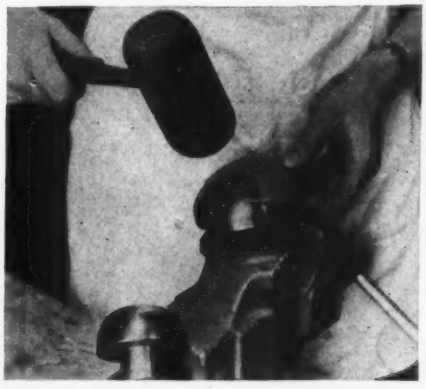


Fig. 5. Straightening with mallet and mushroom stake

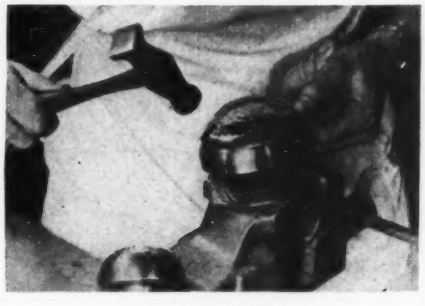


Fig. 6. Planishing

Do this on both sides. On one side these lines are used as a guide for raising and on the other as a guide for planishing. Lay out a radius line as a starting and stopping place for each of the concentric circles.

Raising: With a raising hammer beat the disk into a hollow in the sandbag or into the circular depression in the end grain of the wooden forming block as illustrated in Figure 3. A round end wooden forming mallet can be used in place of the raising hammer. Start and finish hammering at the radius line. Follow the concentric circles around the disk by revolving it as the work progresses. It is necessary to hammer in the same spot on the sandbag during an entire circle, preferably for the entire raising process. This gives the bowl a uniform contour that is impossible when the disk is not revolved. Lift the bowl, as shown in Figure 4, when the edge is approached, but hammer in the same spot to secure a symmetrical curve. The extent to which this bowl is raised should not necessitate annealing, providing the disk was annealed before starting.

Straightening: Straighten the tray over a

Fig. 7. Deep planishing marks are secured with this type hammer

smooth polished mushroom stake with a wooden mallet. See Figure 5. Select a spot on the stake that will give the desired contour and strike on that spot during the entire straightening process.

Planishing: Planish with a smooth polished planishing hammer, as shown in Figure 6, over the same stake used for the straightening process. Use the same spot on the stake during the entire process to secure an even planish. The section of the planishing stake that is selected should match as nearly as

Fig. 8. Starting beating down the base

possible the inside contour of the bowl. A very uniform planish can be secured by delivering the blows with the planishing hammer in one spot and moving the bowl to space the planishing marks. It is very difficult to place blows accurately with the hammer unless the hammering movement remains constant and the bowl is moved along. This planishing operation applied to the surface of the bowl removes all irregularities leaving a true, smooth, and refined curve and a finished surface ready for buffing. It is possible to anneal the work and repeat the planishing operation if the desired results are not obtained at first. If one desires to make the planishing marks deeper, a planishing hammer similar to the one illustrated in Figure 7 should be used. This hammer has a smaller ball end that

Fig. 9. Beating the ridge to shape the base

Fig. 10. Adding height to the base with raising hammer

makes the deeper marks. To secure deep marks strike the work hard with this hammer making the marks large as well as deep. Sometimes it is necessary to straighten the bowl after this process by the method illustrated in Figure 5 and described previously. To secure small planishing marks use the hammer shown in Figure 7 with light or medium blows.

Shaping the base: Set down the base with the planishing hammer as shown in Figure 8, starting in the center and following the ridge until the base is as large as originally planned. Strike only on the ridge (Fig. 9) with the planishing hammer. This will raise

Fig. 11. Fluting

the base in the form of a dome. If the base does not raise as high as desired when using the planishing hammer, it can be increased by beating the center with the raising hammer, as shown in Figure 10. In addition to the base described in Figures 8, 9, and 10 it is possible to make many other attractive bases for this bowl. A few possibilities are given in Figure 13.

Fig. 12. Filing V-shaped notches

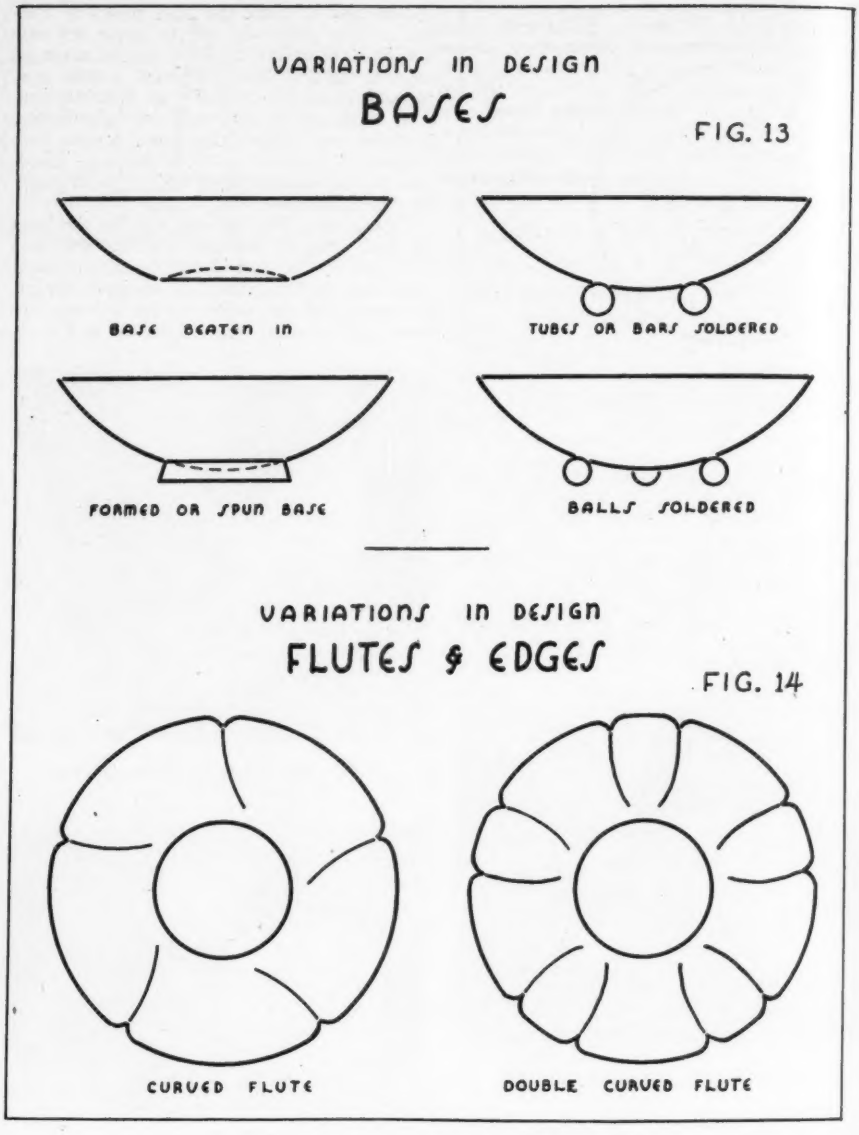


Fig. 13. Variations in design of bases
Fig. 14. Variations in design of flutes and edges

Fluting: Flute the edge with a brass chasing tool over a groove shaped in a block of hardwood, as shown in Figure 11. Space the grooves evenly around the bowl. Three or five flutes seem to give the best appearance. All flutes should be the same length.

Scalloping: File V-shaped notches at the ends of the flutes, as indicated in Figure 12, and file the outline of the bowl to a scalloped design. There are enormous possibilities for variations in the design of the flutes and edges. Figure 14 shows how the bowl can be made to look entirely different merely by changing the design of the flutes and edges.

Finishing: If a smooth polished hammer was used for the planishing very little buffing will be necessary. However, the bowl should be buffed lightly with rouge to give the metal its characteristic color. Too heavy buffing with tripoli removes the ridges that give the planishing marks their character. Color the project chemically, if desired. Lacquer it with metal lacquer or wax and polish.

CHILD'S CHAIR AND TABLE

Hazel F. Showalter,
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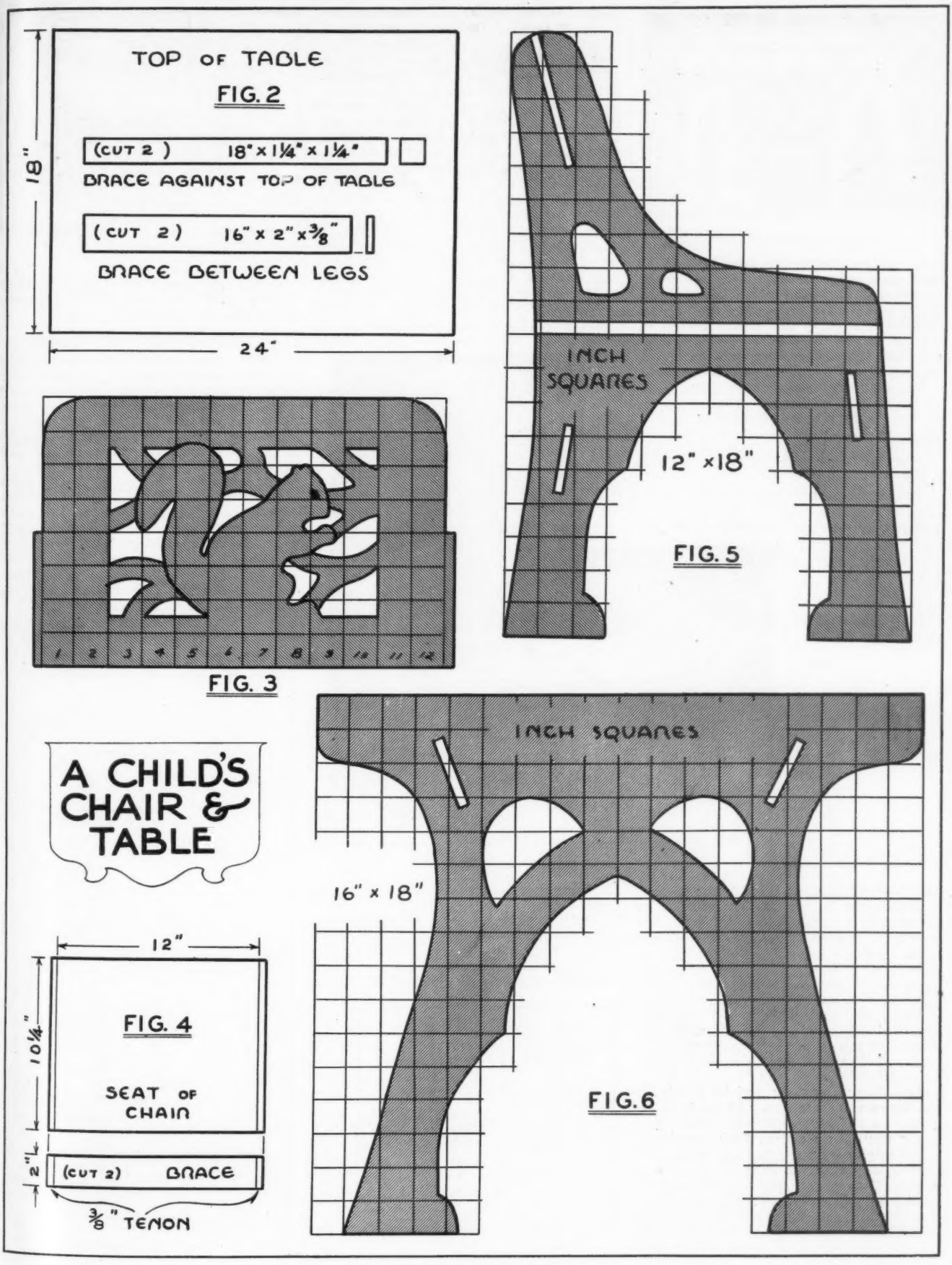
The chair and table shown in Figure 1 will delight a small child and will give him that aid to proper posture that only furniture to suit his size can give.

One-inch white pine and ⅜-in. plywood were used for both pieces of furniture, but ½-in. hardwood might be substituted for both. The braces under the table top, shown in Figure 2, should be made of 1¼-in. wood.

The back of the chair with the jigsaw design, shown in Figure 3, is cut from plywood; the other parts, shown in Figure 4, of 1-in. wood for the sake of sturdy construction. The back, the seat, and the two braces are mortised to the sides of the chair which form the legs. See Figure 5.

The top of the table is of plywood to avoid excessive weight. The end pieces that



Details of child's chair and table

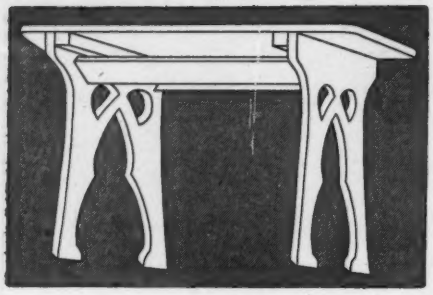


Fig. 7. The assembled table

form the legs, shown in Figure 6, are of 1-in. white pine, the braces under the top of the table of 1¼-in. white pine, and the braces between the upper parts of the legs, plywood. The heavy braces are fastened to the top and to the ends of the table with glue and screws, the ends of the lighter braces are mortised to the ends of the table.

Figure 7 shows the assembled table.

METAL FINISHING

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Senior High School,
Rockford, Ill.

The quality of a finished project in sheet-metal or cold-metal work may be considerably improved by resorting to some simple decorative methods. A common spray pump, either a hand pump or one supplied with an air compressor, is essential in securing the best results for decorative work. Either lacquer or enamel may be used. If a project has been finished in mandarin red, a very light spray of black will improve its appearance. A bread-box enameled a nile green when sprayed with a very light touch of black, will take away the dead, flat appearance of the solid color finish. The most elementary students in metal-work will do a good piece of work using this method for finishing projects.

Stencils, such as those used for bread- and cakeboxes and flour bins, add much to the value of a project when finished. Good stencil paper may be made from 20-lb. pressboard, which may be secured in any print shop. After cutting out the stencil, apply several coats of shellac. Too many sprays should not be attempted with one stencil. When the stencil has been used for about six projects the finish that has accumulated on it should be washed off, for when the enamel begins to lay on in thick layers, the letters will be outlined very poorly. The method used in applying a stencil is shown in Figure 1. After the stencil has been attached with adhesive tape, a sheet of wrapping paper, with an opening large enough to expose the stencil, is fastened over the container, as shown in Figure 2. This is done to keep it clean when the spray is used.

The work of keeping brushes in condition for more than one year's use may be easily done by using the brush container and holder shown in Figures 3 and 4. An ordinary tin can fitted with an upright piece of metal with the brushes hanging in oil is all that is necessary. These in turn are kept in the large container as shown in Figure 3. This large container provides space for a number of containers. The cover rests on supports spaced evenly in the water area. A small vent hole in the cover allows the air to escape when the cover is put in place. The fact that little or no air is changed under the cover, keeps the oil from drying.

Fig. 1. Child's chair and table

The turpentine, oil, etc., is kept in large glass bottles, whose corks of glass fit very tightly. Each bottle is labeled with a piece of tape on which is written the contents of the bottle. By covering this label with paraffin it is kept very legible. When soiled, scratch off a little paraffin and your label is again like a new one.

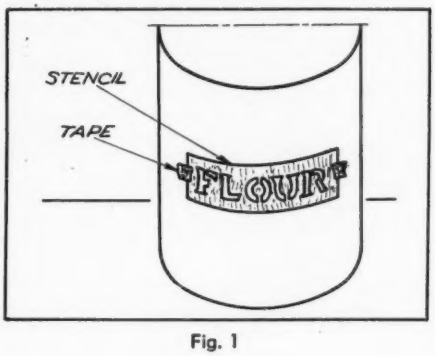


Fig. 1

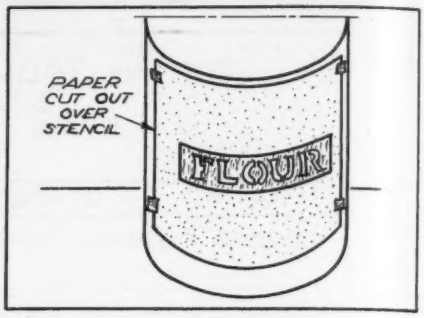


Fig. 2

Finishing Metal Garden Furniture

Projects which are made of metal and given a finish resembling the more expensive garden furniture are well adapted to an advanced class in the sheet-metal shop. Such pieces as urns, birdbaths, sundials, etc., may be finished in the following manner: Wash the project thoroughly with a solution of vinegar or acetic acid. This will roughen the surface in preparation for the finish. Cut the entire surface with steel wool. Now cover the surface with a coat of aluminum paint. This makes an excellent base for the succeeding coats of paint. Secure good house paint ready mixed if desired, or mix it to form a rock color. Add one part of spar varnish to four parts of paint. Mix it by the painter's method of *boxing*, that is, use two buckets and pour the paint back and forth in place of using a paddle. Apply one coat of paint and let the project dry for 48 hours in a well-ventilated room. After the

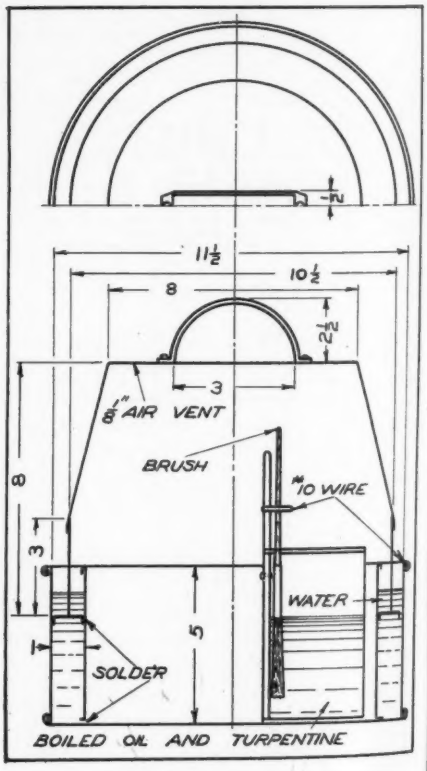


Fig. 3. Brush container

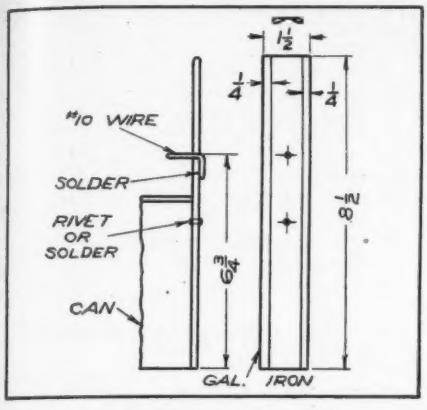


Fig. 4. Brush container detail

second coat of paint has been applied, apply the sand either with a hand sander or with a forced air spray. Figure 5 shows how a sand sprayer may be made if air pressure is available. Use a very fine crystalline sand, preferably the kind which may be purchased at a paint store. Do the spraying in a portion of the shop where the surplus sand falling on

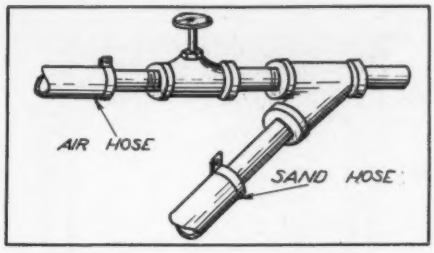


Fig. 5. Sand blower

the floor may be swept up and used again. If the first coat of sand is not heavy enough, apply another coat of paint and sand a second time. A hand sand blower may be purchased from any paint store. Small flower urns or jardinieres for indoor use also may be finished with enamel and then sanded. A still more decorative effect may be secured by using coats of colored enamels.

The surface of an urn which comes in contact with moist earth should have a coat of asphaltum or several coats of heavy paint. This will give sufficient protection to the metal to keep it from rusting.

ADJUSTABLE TYPING AND READING STAND

Victor Tiedeman,
State Teachers College,
Duluth, Minn.

The adjustable typing and reading stand is a practical sheet-metal project involving many hand and machine operations.

The stand can be used for holding a book so one can copy, or type notes and read from it. It can also be used for holding notebook paper so one can type from the paper very easily.

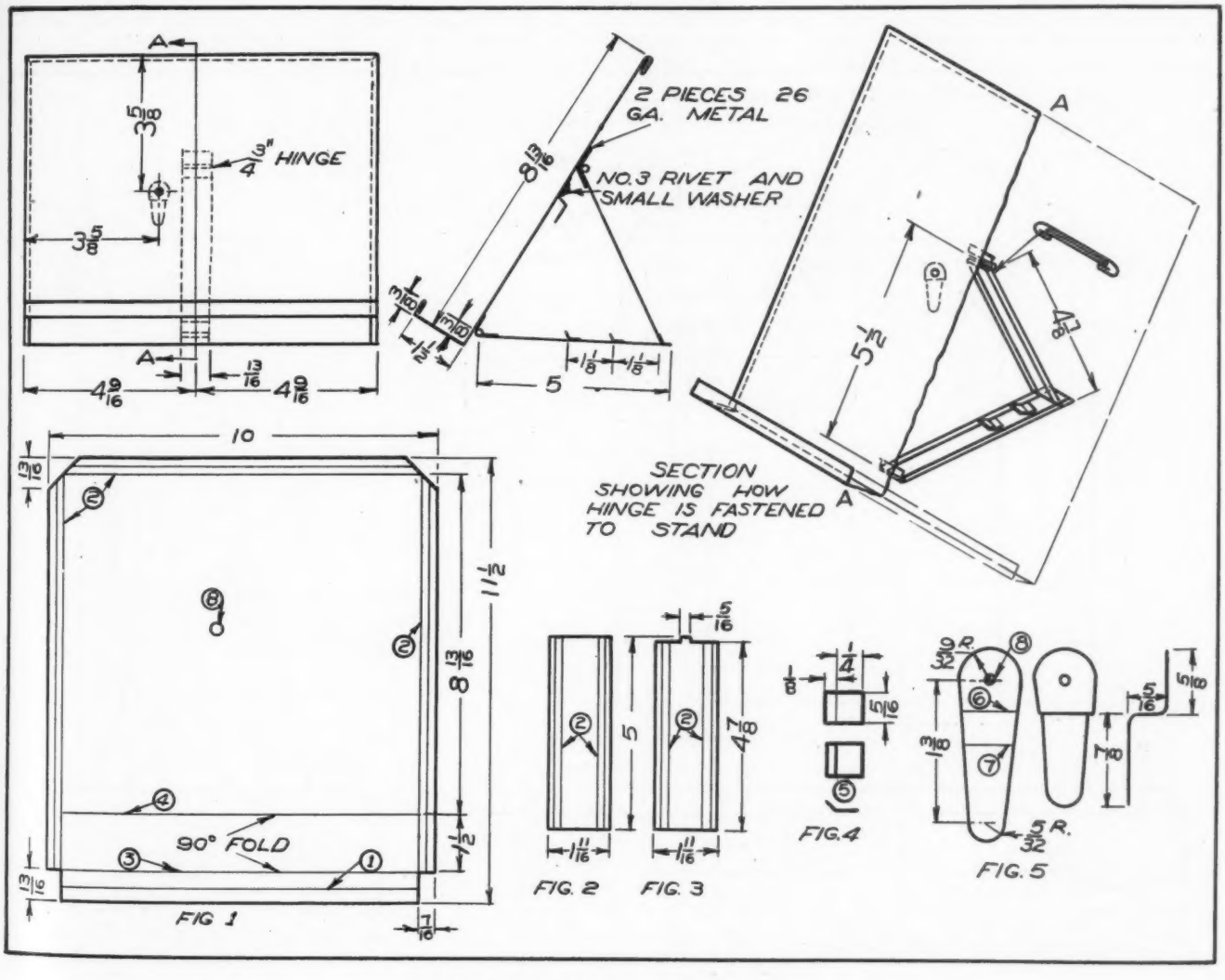
Tools and materials required: Steel ruler, dividers, tin snips, rivet punch, rivet set, solder and flux, soldering copper, steel wool.

Machines required: Squaring shear, cornice brake machine, bar folder.

Procedure for Adjustable Typing and Reading Stand

1. Cut from 26-gauge galvanized metal the following:

1 piece 11½ by 10 in.
2 pieces 5 by 1 11/16 in.
3 pieces ⅜ by 5/16 in.
1 piece 1 13/16 by 9/16 in.
2 pieces ¾ by 5/16 in.



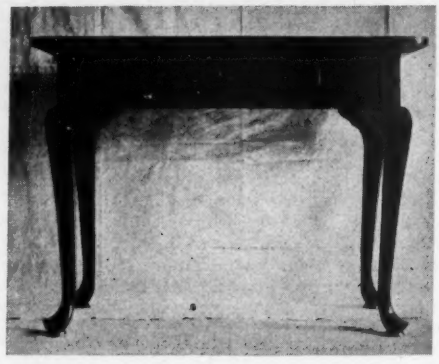
Details of adjustable typing and reading stand

2. Trim all corners of the metal as shown in Figures 1, 3, and 5.
3. Take work to brake and form to 180 deg. the line No. 1.
4. Set bar folder to 3/16 in. and double hem the lines marked 2.
5. Brake lines marked 3 and 4 to 90 deg. on the cornice brake.
6. Form 3 pieces 3/8 by 5/16 in. to 45 deg. as shown in Figure 4.
7. Form 1 piece as shown in Figure 5.
8. Punch rivet holes marked No. 8 for No. 8 rivet.
9. Bend catch marked No. 9 to 45 deg. in Figure 3.
10. Solder hinges to Figure 2 and Figure 3.
11. Solder hinges to back with shims under upper hinge.
12. Solder catches to bottom part of stand as shown in side view.
13. Insert No. 8 rivet in hole No. 8, Figure 1, and fasten Figure 5 on the back side using small washer.
14. Polish metal with 2/0 steel wool.

PHOTO STAND

H. C. Rose,
Southern Illinois State Normal School, Carbondale, Ill.

The photo stand illustrated herewith is a practical inexpensive project, and one which involves a large number of operations. When



Queen Anne hall table

used as a hand woodworking project, it is a challenge to the beginner and will give him a contact with many tools. As a project for studying production methods in the more advanced courses, it has value because of its small size and because of the range of tool *setups* required.

The following is a list of operations to be found in this construction.

1. Square up stock to size.
2. Cut a chamfer.
3. Cut a dado.
4. Cut outside profile.
5. Cut inside profile.
6. Rabbet.
7. Cut a miter.
8. Use glue.
9. Drill and countersink.
10. Set a flathead screw.
11. File and sand.
12. Stain.
13. Shellac.
14. Use steel wool.
15. Varnish.
16. Use sandpaper on finish.
17. Use pumice stone.
18. Cut and fit glass.

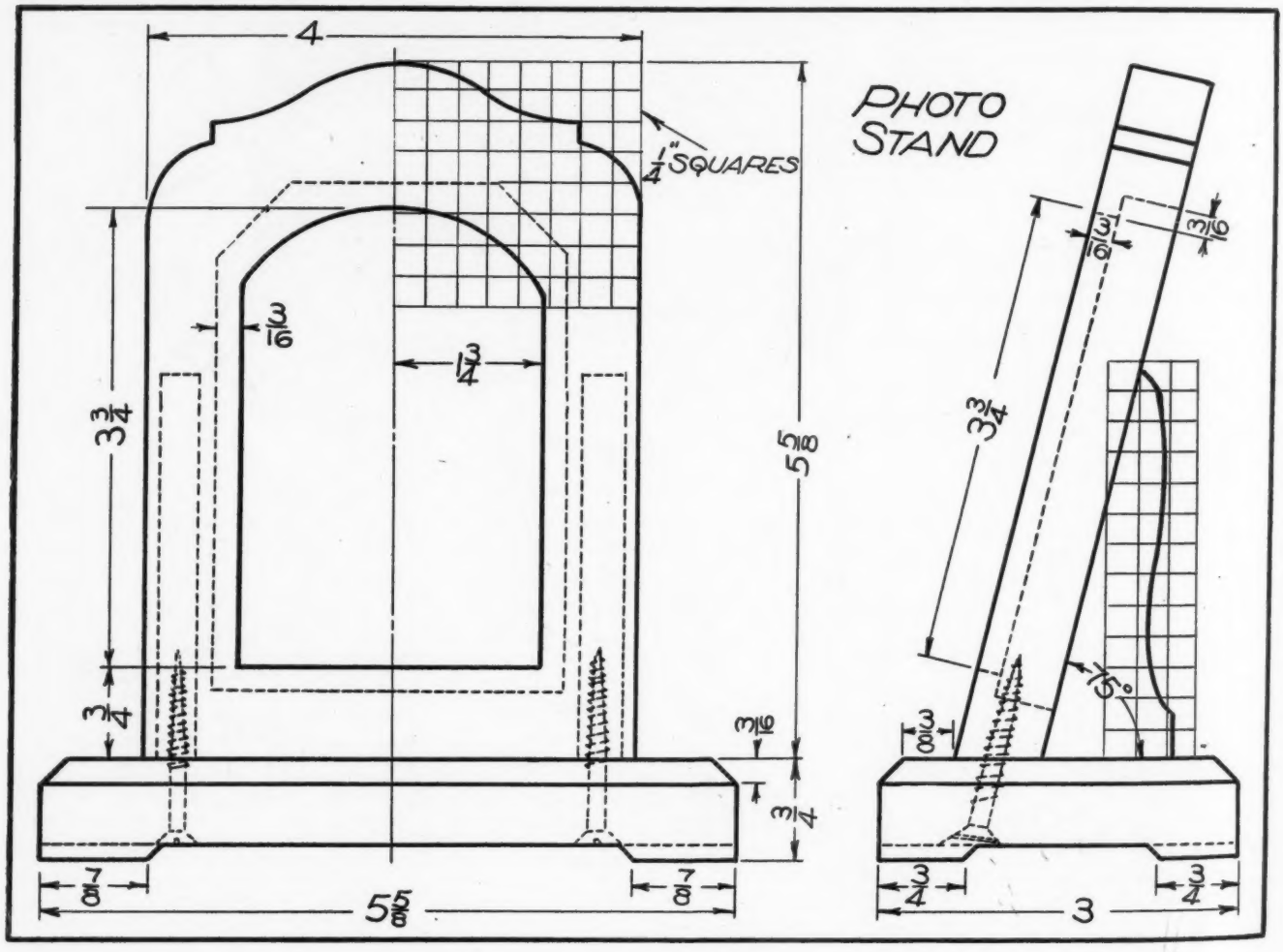
QUEEN ANNE HALL TABLE

Franklin H. Gottshall,
Martha Berry College, Mt. Berry, Ga.

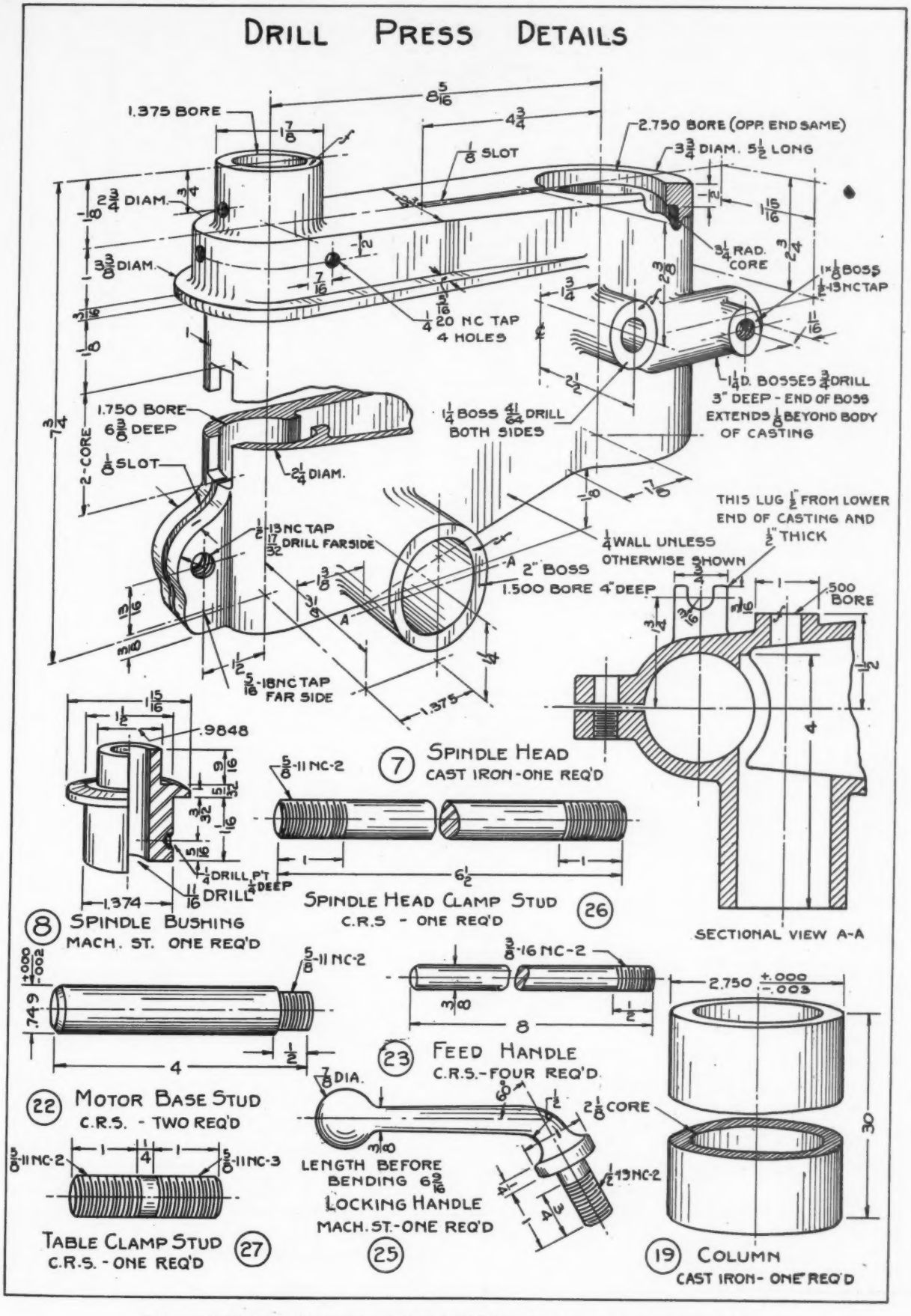
The table shown herewith is quite suitable for use in a hallway. It is equally suitable for a moderate-sized living room if placed against the wall, or it may be used as a serving table in the dining room. The table should be made of walnut.

This project is not difficult to make and should furnish an interesting problem for the boy who wishes to make an unusually handsome piece of furniture. The greatest difficulty that will be encountered is the making of the legs. This difficulty will be

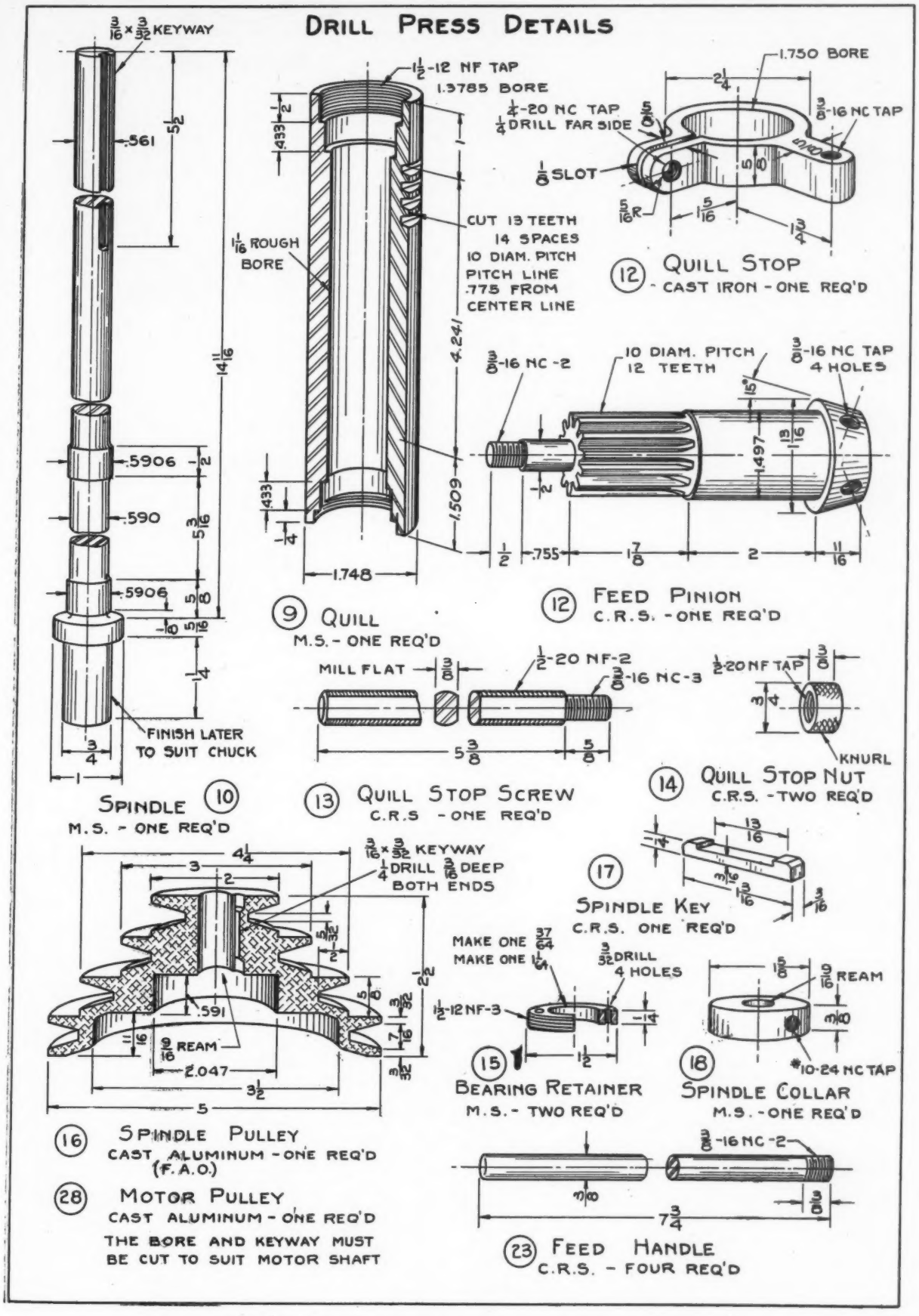
(Continued on page 344)



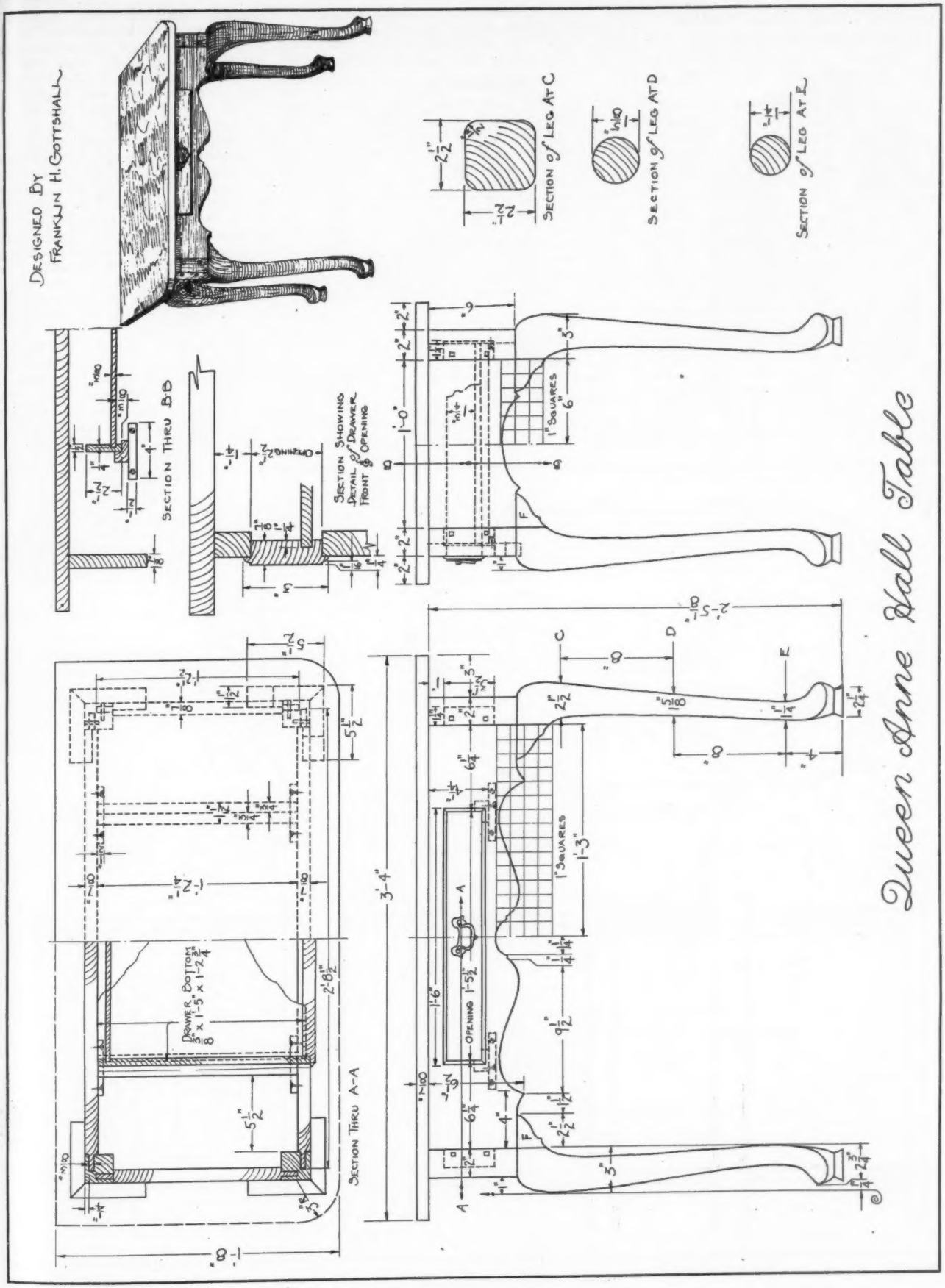
Details of photo stand



Drill press details by W. A. De Vette, Erie Technical School, Erie, Pa. For description, assembly, and other details see pages 290, 293 and 295 in the September 1941 issue



Drill press details by W. A. De Vette, Erie Technical School, Erie, Pa. For description, assembly, and other details see pages 290, 293, and 295 in the September 1941 issue



Queen Anne Hall Table

Queen Anne hall table designed by Franklin H. Gottshall. For description see page 338

QUEEN ANNE HALL TABLE

Continued from pages 338 and 343)

easily solved if the correct procedure is pursued. To make the legs proceed as follows:

Make a pattern of the profile of the leg on a piece of cardboard. This pattern should not include the blocks *F*, as these should be glued to the leg just before assembling the table and cut to shape after gluing. Lay the pattern on one side of the stock, mark around it with a sharp pencil, and cut on the band saw. Then take the same pattern and lay it on the adjacent side of the same leg and after marking, again cut on the band saw. Thus we have a leg shaped as we want it except that it is square in section throughout. This square section is then worked to an octagon section from a point about three inches below *C* to the foot. This is done with a drawing knife, spokeshave, and chisel. This step makes it easy to finally work the leg to a true round section. The foot should cause no great difficulty if it is treated in much the same way. The toe of the foot points diagonally outward.

The drawer has a lip molded around the edge of its entire face side. The drawing shows this clearly. It is suggested that the drawer sides be dovetailed to the front, though other drawer joints may be used.

Bill of Material

Top, 1 pc. ⅞ by 20 by 40 in.
Front apron, 1 pc. ⅞ by 6½ by 32½ in.
Back apron, 1 pc. ⅞ by 6 by 32½ in.
Side aprons, 2 pc. ⅞ by 6¼ by 14½ in.
Legs, 4 pc. 3 by 3 by 29⅛ in.
Blocks *F*, 8 pc. 1½ by 2½ by 2½ in.
Drawer front, 1 pc. ⅞ by 3 by 18 in.
Drawer sides, 2 pc. ½ by 2½ by 15⅝ in.
Drawer bottom, 1 pc. (three-ply veneer panel stock) ⅜ by 17 by 14¾ in.
Drawer back, 1 pc. ⅜ by 1¾ by 17 in.
Drawer runs, 2 pc. 1 by 1½ by 14¼ in.
Blocks to support drawer runs, 4 pc. ½ by ½ by 4 in.

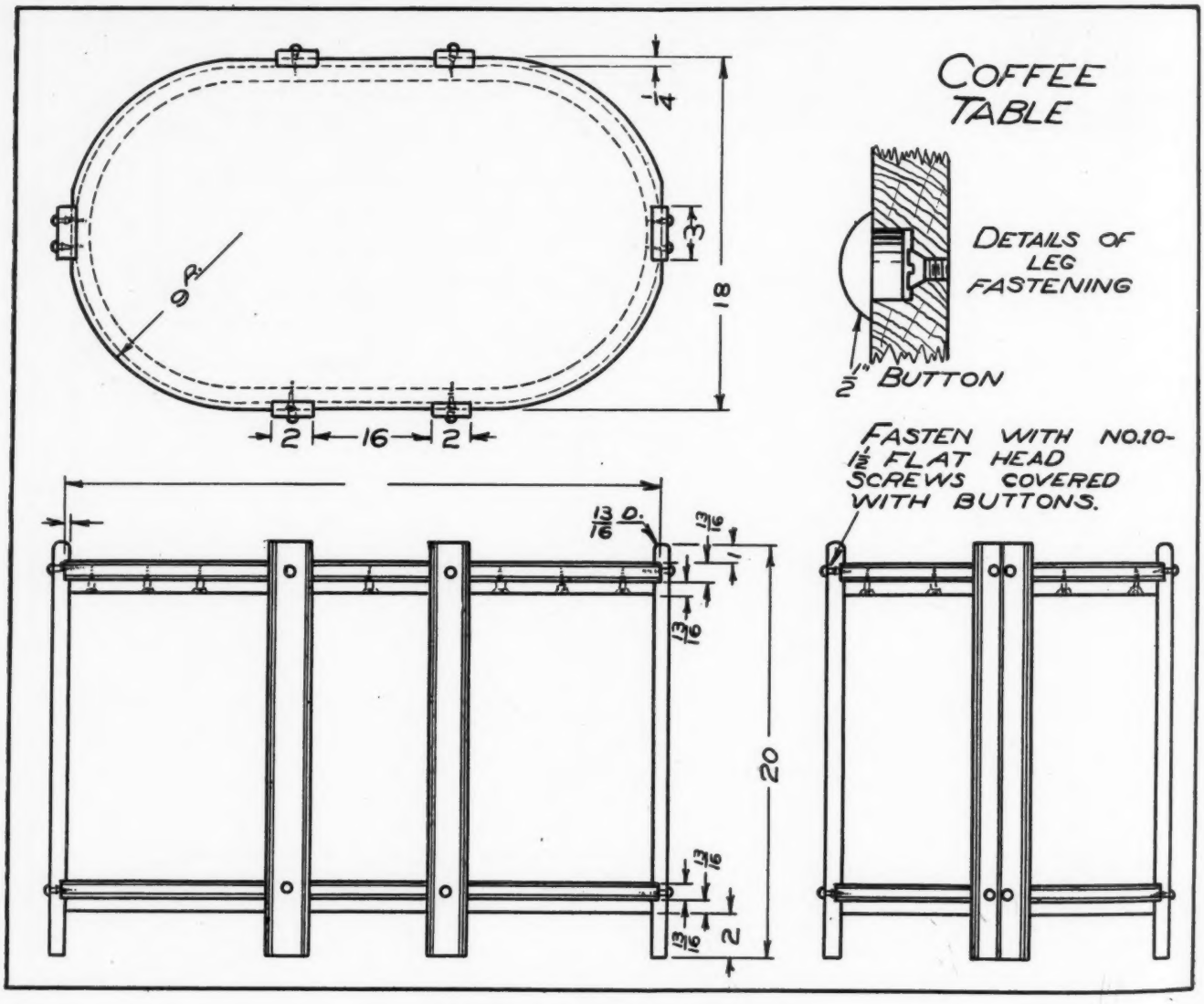
MAGNETO GENERATOR

Jos. J. Lukowitz,
Public Schools,
Milwaukee, Wis.

Frequently it is difficult for boys to appreciate the fact that when a conductor cuts magnetic lines of force, an electric current is generated in the conductor. One of the most convincing ways of demonstrating this fact is to construct the small magneto generator shown in Figure 1. This generator will light a small flashlight bulb brightly. In fact, if the generator is turned too rapidly the bulb will be burned out.

The construction is extremely simple and only commonly available materials are used. Certain dimensions are omitted because these depend upon the size of the magnets used for the field. Magnets such as those illustrated can be purchased from firms which furnish scientific equipment to school physics laboratories. The magnets illustrated in Figure 1 are 5½ in. long and the poles are 2 in. apart. They are made of ½ by ¾-in. steel.

The lower wood block for the base should be ¾ in. thick, and the smaller upper block should be ½ in. thick. The length of the upper block should be such that the magnets can be slipped on and off easily. Decreasing the strength of the field by using two magnets will require more speed to generate the same current as produced with three magnets. The strength of the magnets will, of course, affect the current induced in the armature. The



Modern coffee table designed by Louis Barocci

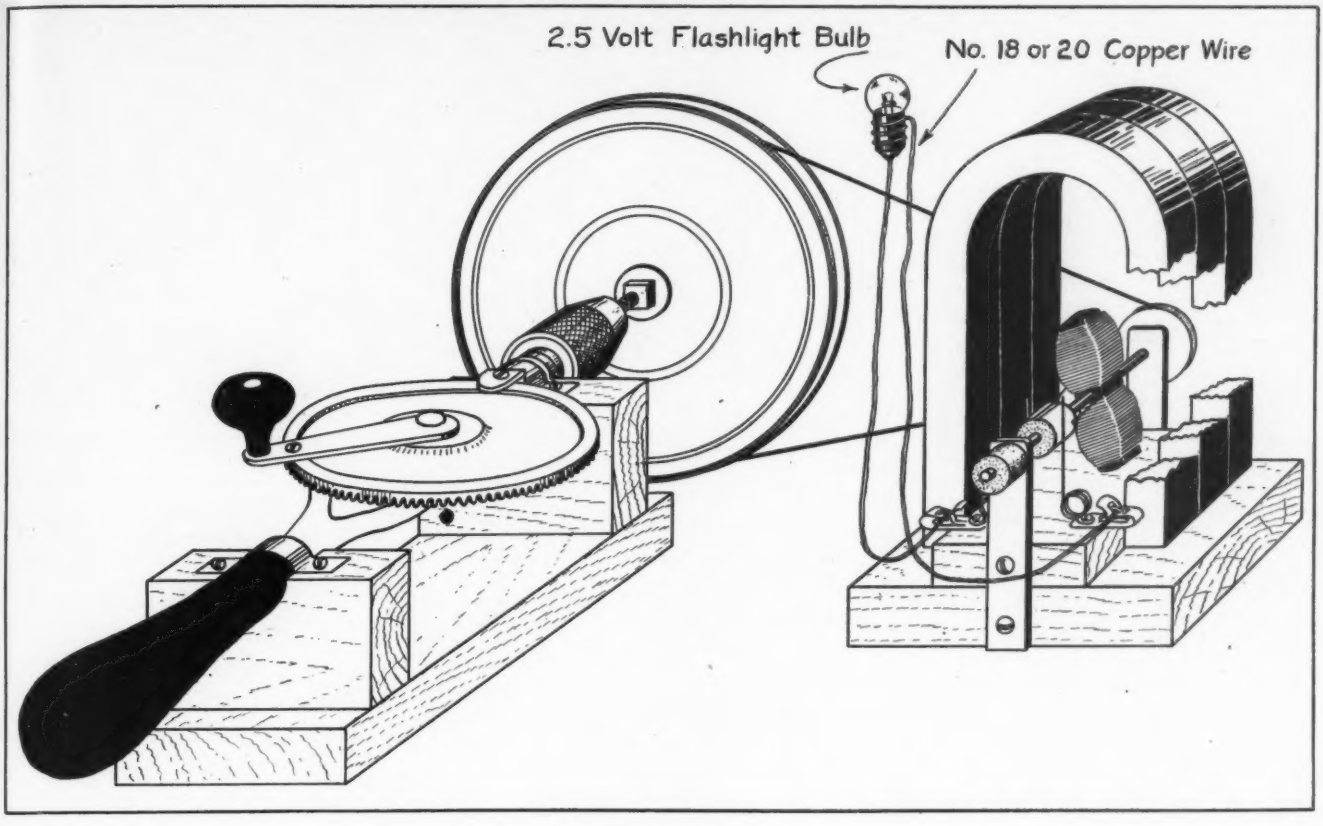


Fig. 1. Magneto generator

effect of variations in speed of the armature or of the strength of the field can be vividly demonstrated with this device because the boys can actually see the light become dim and bright as the conditions which influence the current generated are changed.

Armature

The armature is made of a piece of ⅜ by ¼-in. soft steel. It is fastened to the shaft by center punching to the shaft from two opposite sides forcing the metal tightly against the shaft.

Commutator

The commutator core is made of a piece of rubber tubing such as is used for the tires on baby coaches, coasters, and scooters. This rubber can be purchased in various diameters with a hole in the center. The sizes specified in Figure 2 can be purchased for a few cents a foot. The size of the hole in the rubber may vary with different brands. For a 5/32-in. shaft the hole in the rubber should be ⅛ in. or less. If the hole is too small it can easily be enlarged with a drill. Shafting, ⅛ in. in diameter is not suitable, because the rubber will not grip the shaft tightly enough. For this reason, it is better to use drill rod which is 5/32 in. in diameter. Shafts made of this size do not bend so easily, and fewer drills will be broken when drilling the armature and bearings.

To determine the size of the brass tubing for the commutator segments, measure the diameter of the rubber when it is in position on the shaft. The diameter of the rubber will be greater when it is on the shaft because the rubber expands slightly as the shaft is driven into position. The brass tubing should fit snugly over the rubber. If the tubing is a little too small, the rubber may be reduced to size with a coarse file, or with a piece of abrasive paper on a stick.

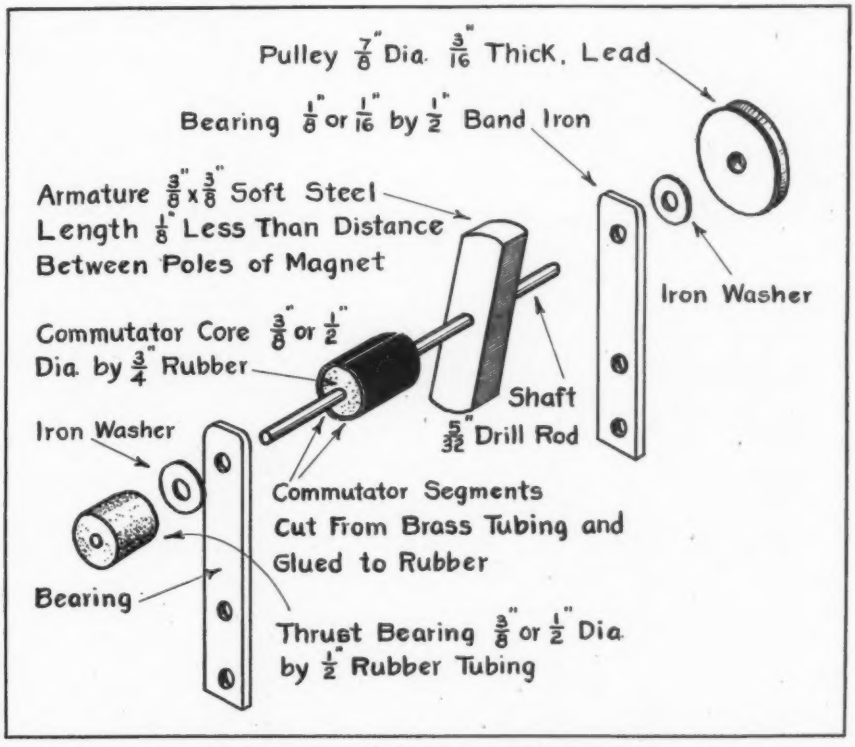


Fig. 2. Armature, shaft, bearings, and commutator

Should the tubing be a little too large, paper may be wound around the rubber until the segments fit properly. Remember to glue the paper securely to the rubber. When gluing the segments in position, be sure that the

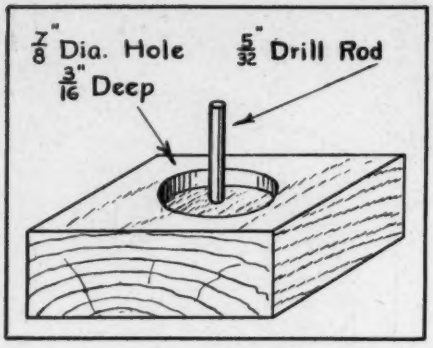


Fig. 3. Pulley mold

gap between the segments is in line with the poles of the armature. A piece of wire wound once around the commutator and twisted with pliers until the segments are correctly spaced makes an excellent clamp. When the glue is dry remove the wire clamp and wash and sandpaper the segments perfectly clean. Use extremely fine sandpaper. When gluing the segments it is well to apply a drop of glue, or shellac, to the ends of the rubber core. This will seal the rubber and prevent oil from creeping along the shaft and rotting the rubber.

Armature Winding

The armature shown in Figure 2 turns between poles that are 2 in. apart. Therefore make the armature core 1⅞ in. long. Wind 65 ft. of No. 28 d.c.c. wire onto the core. Before winding, insulate the core by gluing a layer of paper to the metal. Since the winding space is quite small it is well to leave the paper longer than the armature and when the glue is dry, cut or file the excess paper off the ends of the armature. This will insure complete coverage or insulation at the ends and make more winding space available. Eight layers, that is about 188 turns of wire, should be wound on each pole of the armature. Shellac each layer when it is completed and bank the layers carefully so that they will not slip off. Each pole of the armature is wound in the same direction. Apply shellac liberally when the winding is finished and do not operate the generator until the shellac is dry otherwise the windings may be dislodged. The two ends of the winding are soldered one to each segment.

Bearings

The bearings as shown in Figure 2 are extremely simple. If desired, felt oilers may be provided by cutting ½ by 1-in. strips of felt and punching a hole for the shaft through the center. These felt oilers may be tied with thread or string to the outside of the bearings. The end thrust of the shaft is taken up by the lead pulley which is soldered to the shaft. The thrust at the other end is taken up by a small piece of rubber tubing of the kind that is used for the commutator core.

Pulleys

The small pulley may be cast in lead in a simple mold such as is illustrated in Figure 3. Be sure the drill rod is set perpendicular in the mold. The V groove in the pulley should be filed with the edge of a coarse file.

Figure 4 shows the details of the large pulley. This is made of two can bottoms. It may be necessary to shape one or the other so that a V groove is formed for the belt. Any necessary shaping may be done by hammering lightly with a ball-peen hammer. The stove bolt and washers should be soldered to the can bottoms. A piece of string or a rubber band makes a good belt. A hand drill held in a cradle, as shown in Figure 1, is a convenient way to drive the generator. A bicycle tire if held against the rubber thrust bearing and revolved slowly will also drive the generator very well. A bicycle drive would eliminate the two pulleys and a rubber thrust bearing could be used on each end of the generator shaft.

Brushes

The brush details are shown in Figure 5. The brushes should be adjusted so that they bear against the commutator with a very considerable pressure to prevent arcing and current loss. The leads to the lamp should be short, not over 6 to 8 in. A lamp socket is not necessary. Solder one lead to the center contact of the lamp and wind the other lead around the shell or threaded part of the lamp.

Keep the commutator clean with extremely fine sandpaper. Never use emery cloth or steel wool. Make sure that the brushes make firm contact.

This machine will also operate as an electric motor by connecting one or two dry cells to the brush terminals and by using one or two magnets for the motor field. However, the brush tension will have to be made very light. An electromagnetic field could be used instead of the magnets and wired in series with the armature. The motor will run on a.c. or d.c. electricity. It is not very advisable to operate the same machine alternately as a motor and a generator because the slight arc at the brushes will pit the commutator and spoil the perfect contact required for successful generator operation.

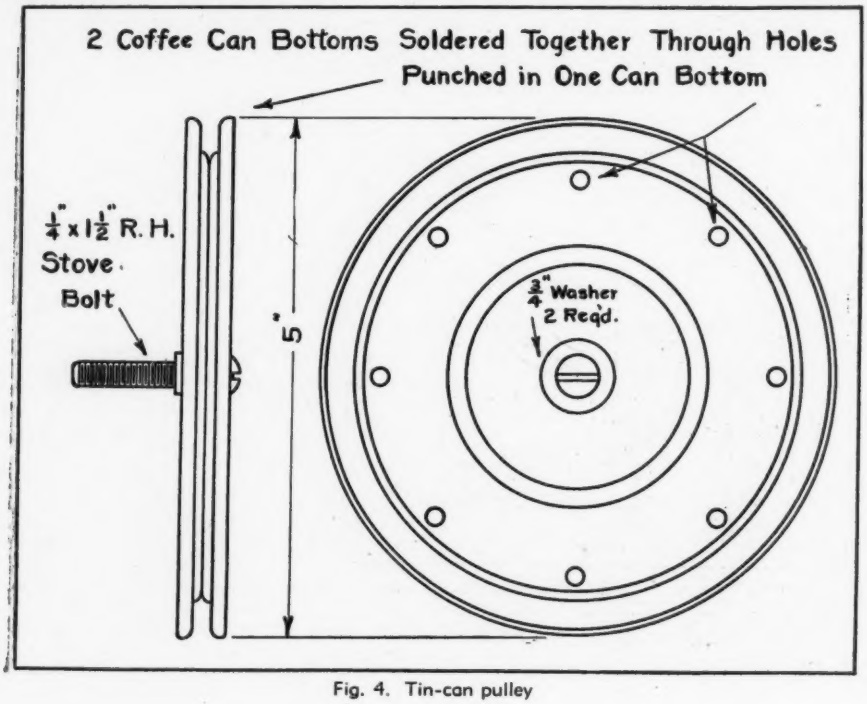


Fig. 4. Tin-can pulley

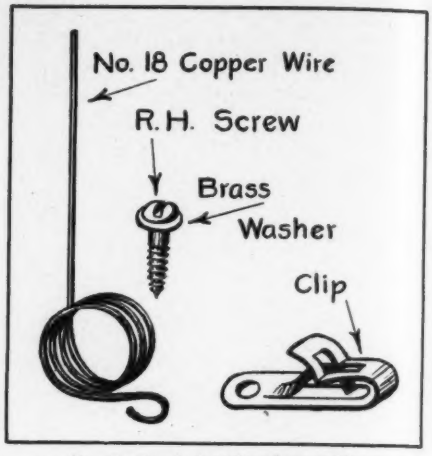


Fig. 5. Brush detail and assembly

SHOP ACTIVITY SIGNS

Peter B. Furnari,
Central School,
Wappingers Falls, N. Y.

The idea of hanging activity signs about the shop is not a new or original one, but it is decidedly useful. The design shown in Figure 1 has been found very useful. The process of making signs of this kind is simple enough so that shop students can make them without encountering much difficulty.

The sign boards may be made of three-ply plywood. They should be shellacked several times and waxed. Small screw hooks are then fastened at the top so the sign may be suspended from the ceiling.

An alphabet, such as the one shown in Figure 2, may be cut from 26-gauge sheet metal to serve as patterns. Such an alphabet is an indispensable item in any shop. Our alphabet has been used many times for various types of sign work such as posters, road and lawn signs. Pattern figures are very useful for door numbers.

After the patterns have been cut out, then the letters are traced on either ¼- or ⅜-in. plywood and any student who has had some experience on the jig saw may cut out the required sign letters. The letters are then sanded on a disk or belt sander or sanded

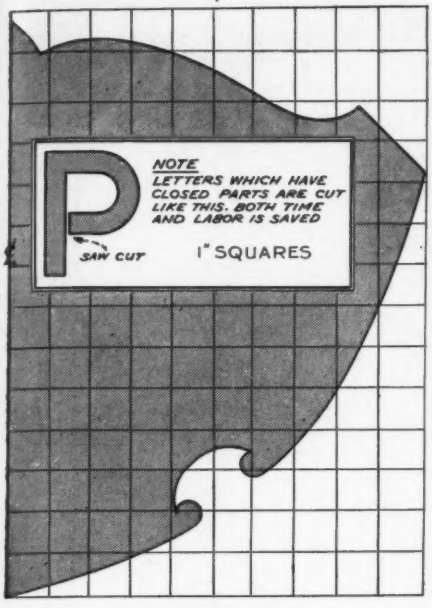


Fig. 1. Design for sign

by hand. If the letters are accurately traced and cut, then very little or no sanding is necessary. Letters are painted with a flat paint, allowed to dry and then tacked in place on the sign board with the aid of the rule as a straight edge.

Various methods may be used for fastening the hangers to the ceiling. This, of course, depends upon the type of ceiling. Toggle bolts were used in our case as we have an acoustical tile ceiling. Wire fastened to the toggle bolts served as hooks from which

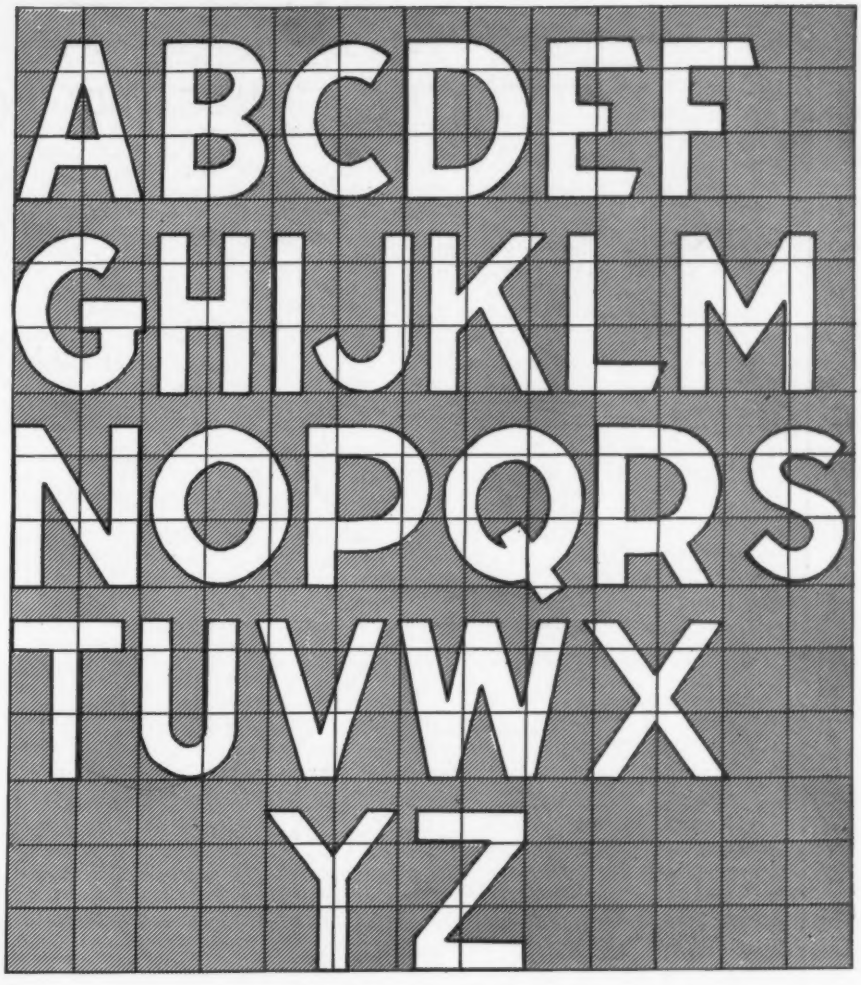


Fig. 2. Alphabet used for shop signs

pieces of safety chain were suspended. Safety chain may be obtained in any hardware store at a few cents a yard.

Figure 3 shows a number of activity signs ready to put up, and Figure 4 shows one suspended from the ceiling.

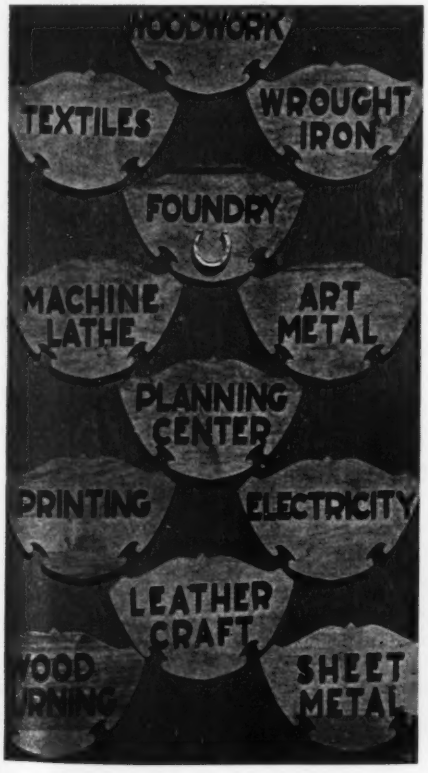


Fig. 3. A variety of shop activity signs

SPADE-FOOT TILT-TOP TABLE

H. W. Michelson,
R. O. Buck,
Chicago, Ill.

The unusually attractive tilt-top table with quaint *spade* feet, shown in Figure 1, is one of the choice small pieces of furniture in the American Room collection of the Metropolitan Museum of Art, New York City.

Fig. 4. An activity sign suspended from the ceiling

Though the table is believed to be well over 150 years old, it is still in excellent condition and may well be considered a tribute to the skill of the unknown craftsman who fashioned it.

The attractive and well-proportioned design rather than the age make the table worthy of reproduction. The museum piece is made of solid mahogany except for the top which is veneered with bird's-eye maple and has inlayed banding and a medallion of walnut veneer.

The center post is turned in a beautiful and well-proportioned vase design. The feet are formed in graceful curves which terminate in unique spades. The whole foot tapers from the top to the shoulder just above the spade. The spade itself is square in section and tapers from ¾ to 1 in. in the distance of 1 in. The fillet above the spade is made slightly concave.

The feet on the original table are dovetailed into the post as shown in Detail A, Figure 2. This joint requires very careful and accurate fitting, but if done properly and well glued, results in an excellent joint. An accurately made dowel joint would probably serve nearly as well, however, and would be much simpler to make, so if you are not concerned about the authenticity of the piece,

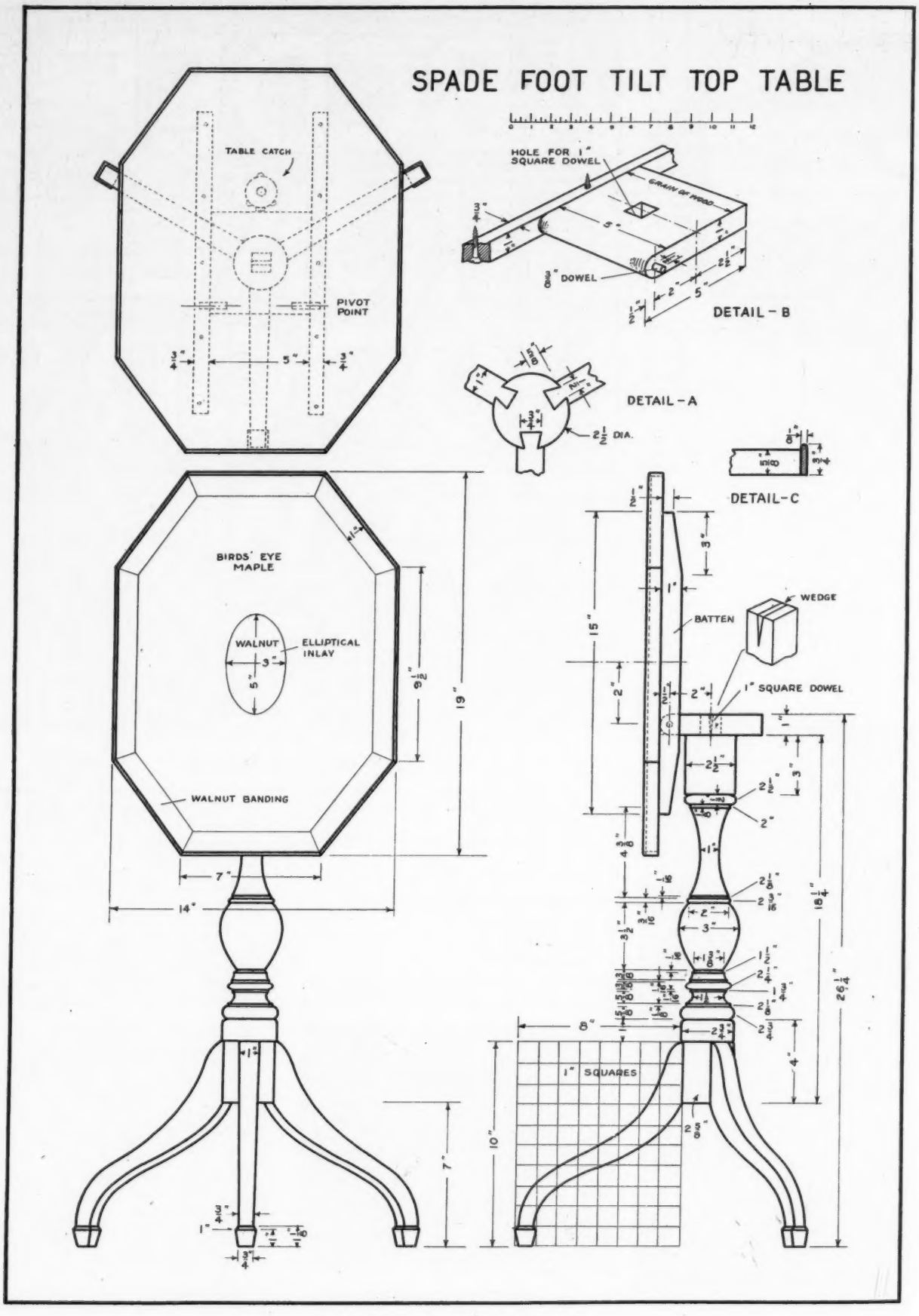


Fig. 2. Details of spade-foot tilt-top table

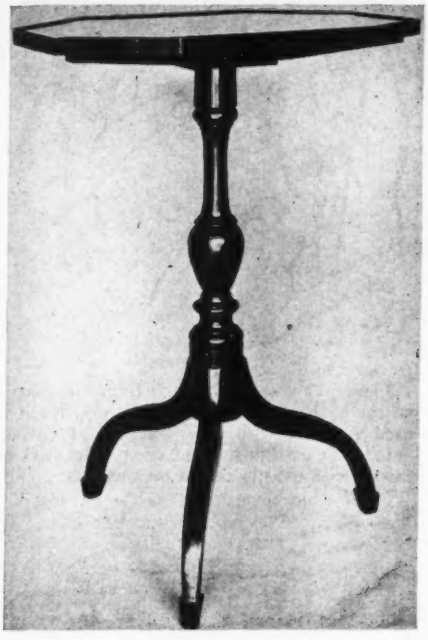


Fig. 1. Spade-foot tilt-top table
Photograph, courtesy of Metropiltan Museum of Art, New York City

the latter method is suggested. Use two ⅜ by 2-in. dowels for each foot.

Detail B, Figure 2, shows the tilting block with a square mortise cut through it for fastening to the top of the post. The battens, which are screwed to the underside of the top, are pivoted to the block by means of dowels located exactly as shown. These dowels extend into the block 1 in., but the holes in the battens are bored only ½ in. deep so that the dowels cannot work out. Because of this arrangement it is necessary to unscrew one of the battens in order to install the top.

The block is glued and wedged to the square tenon at the top of the post in a position which will make the table top tilt over one of the legs. This arrangement has the advantage of giving greater stability to the table, and also makes it possible to place the table nearer the wall when the top is tilted.

The top is made of poplar or tulip wood and is veneered in the arrangement shown. The walnut banding and the bird's-eye maple background are carefully fitted with a veneer knife or razor blade. When cutting out the opening in the maple for the center medallion the walnut should be placed over the maple so that the knife will cut through both of them at the same time and produce a perfect fit. The veneering is accomplished with a glue press in the usual manner.

The edge of the top is finished with a narrow strip of mahogany as shown in Detail C, Figure 2. This strip is carefully mitered at the corners and is glued in place. Care must be taken when installing the strips that the glue is not forced under the edges of the top veneer, as this would produce unsightly bulges. Any surplus glue that oozes out must be removed immediately as the glue will stain the veneer.

There are several types of catches for the tilting top on the market, but the one illustrated was used on the original and this type is still one of the best. The spring catch is screwed to the underside of the top in a position where it will engage the small bent plate which is attached to the block. The center knob is pulled forward to release the catch and tilt the top.

The original table apparently had been given the conventional filler, shellac and varnish finish and was well rubbed down to a beautiful sheen with pumice and oil.

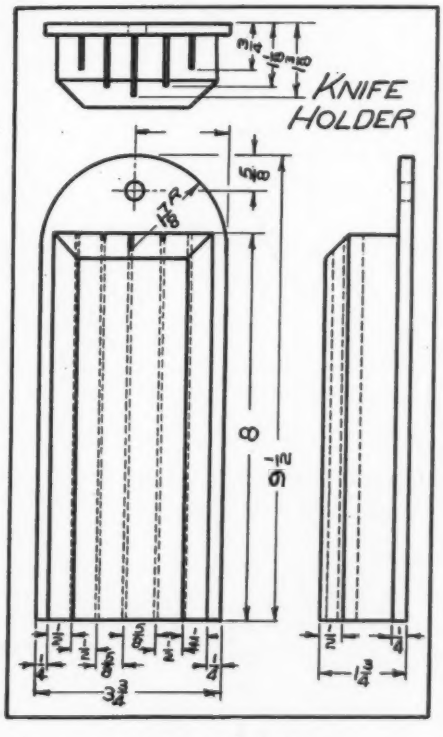
KNIFE HOLDER FOR THE KITCHEN

Harmon Kurtz,
Junior High School,
Joplin, Mo.

The knife holder described herein has been used as an elementary project in beginning woodworking to teach the squaring-up processes and chamfering. In addition to these processes, it embodies many other tool operations. It is designed so that the main part may be constructed from a common 2 by 4 with plenty of space for the beginner to waste.

The grooves should be cut first with a backsaw, and then gone over with a coarse ripsaw with extra wide set. Of course, if it is considered desirable to use power tools, they may be very easily cut with the circle saw. However, a coarse ripsaw will make grooves wide enough for most common kitchen knives.

The back and front should be finished separately in different colored enamel to match the desired kitchen and then the two pieces are to be assembled with ¾-in. brads. A transfer or stencil may be used to decorate the front.

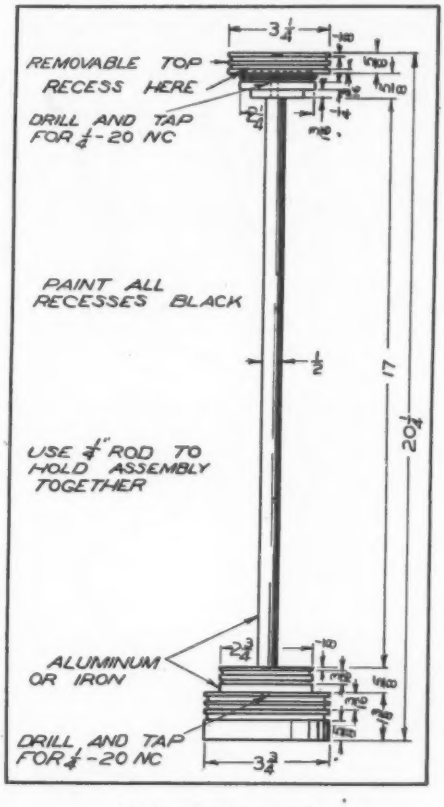


Details of knife holder

MODERN SMOKING STAND

Otto A. Northquest,
Public Schools,
Milwaukee, Wis.

You will find the smoking stand, described herein, most interesting to the boy with a limited amount of lathe experience. The aspect of industrial arts involving the reclamation of worn-out pistons into something of beauty and usefulness, should in itself be worthy of consideration. These worn-out parts, when finished, fit themselves into a design which is modern and most pleasing in appearance.



Modern smoking stand

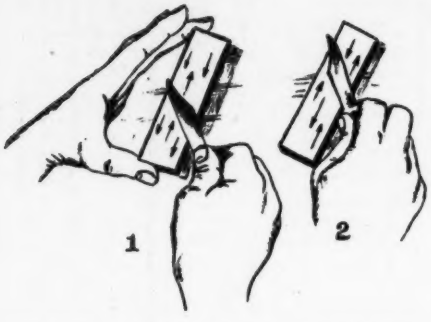
The project demands four pistons of various diameters. When these have been selected the next step is to cut them so that the various heights may be obtained. They are then faced in the lathe. Rounding the top edge is desirable. Be sure to clean out the ring grooves or recesses so the painting may be done effectively. The removable top or tray is undercut so that it will fit over the top piston that is fastened to the stand. This will prevent the tray from sliding out of place. It is usually desirable to turn the inside of the tray to give it a finished appearance.

To hold the parts together, a ¼-in. rod is run through the tube, screwed into the small toppiece and then screwed into the base piece. This arrangement holds the assemblage securely in place. To reduce the cost, a ¼-in. iron pipe may be substituted for the aluminum tube. If iron is used, it is advisable to paint it black.

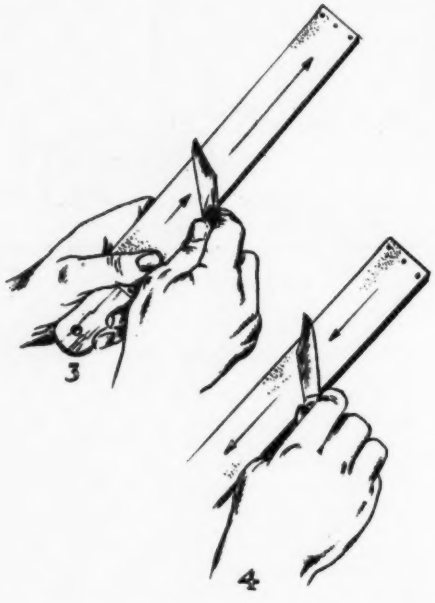
Whittling-Jackknife Technique

W. BEN. HUNT
Hales Corners, Wis.

A good jackknife or pocketknife must be kept sharp. Figures 1 and 2 show how to sharpen such a knife. The blade is first laid flat on the stone and then the back must be raised one or two degrees. If it is raised too much, a chisel edge results. A long tapered edge is best for whittling. Rub the blade back

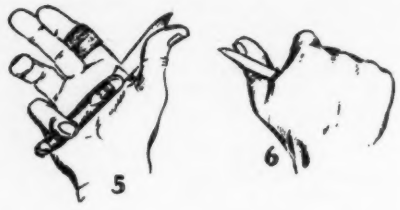


and forth, first one side and then the other, until a fine wire edge appears. Then remove the wire edge on a leather strop or on a smooth piece of wood, using the method shown in Figures 3 and 4.



When no oil or whetstone is available, a piece of very fine emery or carborundum cloth tacked to a 1¼-in. strip of wood will do very well. The direction in which the knife is to be stroked is shown by the arrows. The movement should always be away from the cutting edge. Stropping is done with the same motion to finish the edge. A little rouge or buffing compound worked into the strop will help a lot.

In whittling, as in any craftwork, the first thing to learn is how to hold the tools that are to be used. A knife must be held firmly. Place the knife as shown in Figure 5, then close the fingers over the handle. The back of the blade should be set firmly in the crotch formed by the index finger and thumb, as shown in Figure 6. No part of the handle should show at this point. Then lock the thumb over the index finger, bringing the



handle of the knife tightly against the middle of the palm. The thumb is not to be placed on the back of the blade for the cutting that is done while whittling.

Figure 7 shows the firm grip that is to be used for all rough whittling. The left hand, with which the wood is held, should always be back of the blade, and away from the cutting edge. When it is necessary to cut toward one's self, the wood should be held as is shown in Figure 8. When this is done, one can control the cut somewhat better than when cutting away from one's self. Figure 7 shows

how to hold the wood for making long cuts and Figure 8 for short cuts.

Figure 9 shows how a knife is held for fine cutting. Notice how the forefinger closes around the base of the blade. When holding the knife thus, there is no danger of cutting one's finger, as the blade lies absolutely flat.

Figure 10 shows how the thumb is used as a steady rest. The thumb also helps to pull the blade when cutting. It plays a very important part in whittling.

Figure 11 shows when the thumb is placed on the back of the blade. In this position it is used to push with, as when one is cutting notches or cutting straight down. The stick in this case is usually rested on the knee.

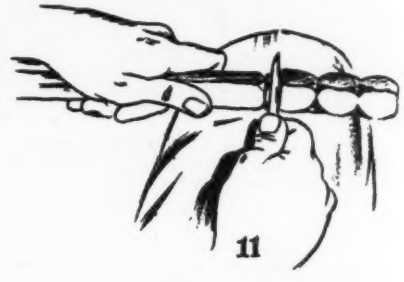


Figure 12 shows where the thumb is again used to steady and pull the blade. In fine whittling, the thumb is generally rested on some part of the wood, sometimes merely to steady the blade and sometimes to help pull it through the wood.

Figure 13 shows the simplest and best method used for cutting spirals. Whittle the full length of the spiral first on one side, then reverse the stick end for end, and cut the other side. This action is repeated until the proper depth of cut has been reached. Perfect control of the blade is thus had at all times.

Figure 14 shows another method of cutting, using the thumb to push the blade. This method comes in handy when the grain of the wood is crooked, and when a careful cut is required. Notice in most of the illustrations that only as much of the blade as necessary projects beyond the clamp of the forefinger. See also Figure 9.

Figure 15 shows the method to be used when deep cutting is required. If this method is not used carefully, a small blade may

be broken off very easily. There are times, however, when this method must be used. The wood, of course, should rest on a knee or table. And, as there is no thumb to steady or regulate the cut, care should be taken when cutting near the edge of the wood, not to go too far, into one's knee, for instance.

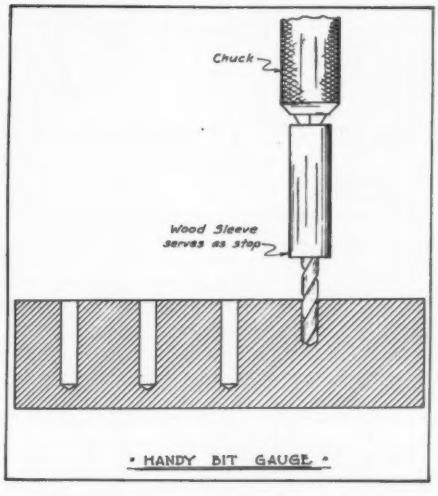
Figure 16 shows another method of making the same cut shown in Figure 15 with less danger of making a wrong cut. It is well to remember that although the thumb is a wonderful steady rest and helps a lot in many ways while whittling, it is not a very good stop for a sharp blade.

Figure 17 shows still another method of performing the same operation shown in Figure 16. When one is doing a lot of whittling, blisters have a way of forming, especially at the inner side of the second joint of the index finger. A thin leather band applied at this point, as shown in Figure 5, will eliminate these blisters. Using the methods pictured in Figures 16 and 17 will afford the hand some rest while working at this delightful old Yankee pastime — whittling.

BIT GAUGE

Jesse E. Rathbun
Public Schools,
San Francisco, Calif.

To make a simple yet surprisingly useful bit gauge, simply bore a hole in the end of a piece of wood which is long enough to cover the necessary portion of the bit, as shown in



the illustration. Determine the depth of the hole to be bored and cut the wooden sleeve off to allow just the desired amount of bit to extend beyond the end. Of course, the other end will rest against the jaws of the chuck.

This little device is especially useful for small bits and twist drills. One advantage it has over the regular metal gauges is that there will be less marring of the surface of the material.

STENCIL WORK MADE EASY

Frank Bentley,
Clinton, Iowa

A somewhat lengthy strip of assembled stencils put together as shown, is usually difficult to handle alone. If the stencil must be applied to a vertical surface, the process is still more difficult.

To make the stencil more manageable, take a narrow stick a bit longer than the assembled stencils. Nail or tack a strip of tire inner tubing or a rubber band to one side of the stick. Press this to one edge of the stencil strip as the brush is used. It will be found that in this way, the stencil may be held down closely to the work surface, and there is almost no danger or possibility of the stencil slipping. In this way a clean job of lettering will be obtained.

Using the stencil guide

STEEL LETTER OPENER

Amos G. Williams,
Professor of Industrial Arts,
Western Union College,
Le Mars, Iowa

The letter opener illustrated herein is reminded of a weapon called a poniard in medieval times. The poniard was a dagger having a long, slender blade and a characteristic heavy handle. Frequently the poniard lacked a hilt or guard.

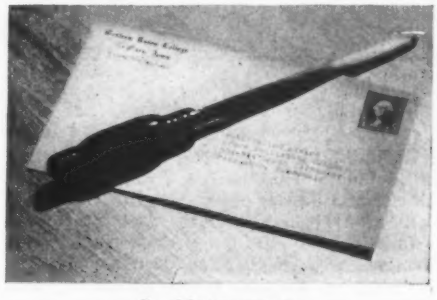
The letter opener may be forged with little equipment. A coal-fired forge is not necessary. The original model was heated in the flame of a laboratory gas burner. The materials required are quite inexpensive.

Forging Procedure

Secure an old 6-in. round taper file. The steel blade and tang of the project are to be forged from it. Soften and anneal the file in a gas flame, or in a forge, and allow it to cool slowly. Then, remove the teeth or serrations from the steel with a grinding wheel.

Use tongs or pliers to place the steel in the fire again and heat the metal to a cherry red. Forge the file on an anvil with a 1-lb. ball-peen hammer. Heat the steel often and strive to keep it straight and uncurved.

Under continued hammering, the metal becomes flattened. The tendency to lengthen is not as noticeable as is the tendency to grow wider.



Steel letter opener

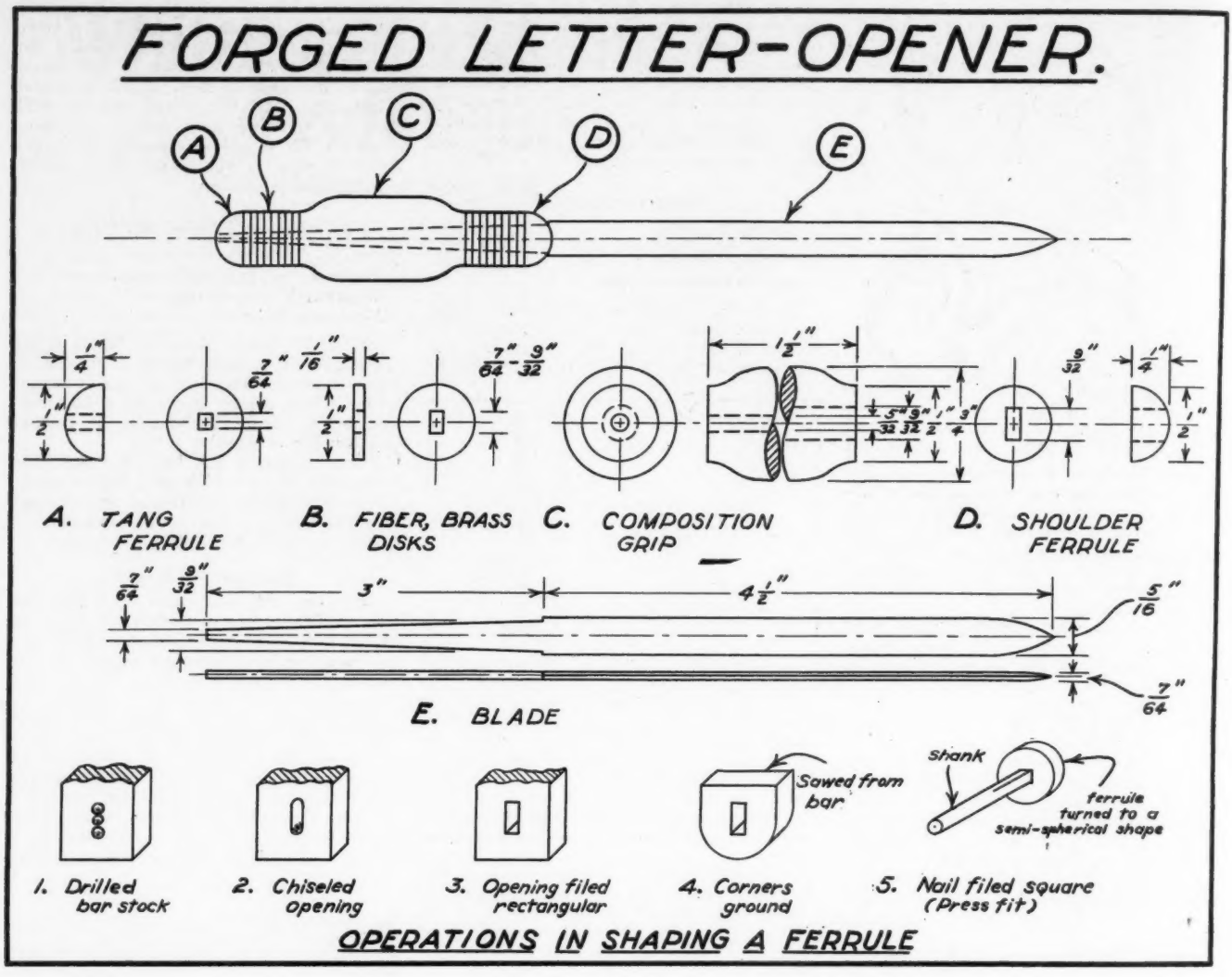
When the thickness of the steel approaches a uniform 7/64 in., the width will be approximately 3/8 in., depending upon the amount of metal that was lost in grinding.

Once the hammering is completed, it is necessary to release the unequal strains that the hammer blows produce in the steel. Anneal the metal thoroughly for several minutes and allow it to cool slowly. If one fails to anneal the steel after hammering, the blade of the letter opener will doubtless warp in the final hardening process.

Shaping the Blank

Grind the steel to a uniform width and thickness. Inspect it for traces of the original teeth marks. Remove the traces by grinding carefully. At this stage, the stock resembles a rectangular bar, tapered at one end.

On the grinding wheel, roughly fashion the



Letter opener designed by Amos G. Williams, Le Mars, Iowa

tip of the blade as it should finally appear in broad profile. Then use the grinder, flat mill file, and tri-square taper file, to sharpen a double-knife edge extending from the tip to within ⅛ in. of the tang. Avoid making extremely sharp edges. Keep them rather dull.

Fasten the blank in a vise whose jaws are protected with sheet copper and shape the tang and the shoulder as indicated in the detail drawing. Drawfile the blade smoothly.

Hardening and Polishing the Blade

The surface is given a finish by using abrasive cloth in a series of grits ranging from coarse to extremely fine. The blade is then ready to be hardened.

File steel hardens readily when it is heated to a cherry red and is dipped into a liquid. A light oil-quenching bath is suitable, though water will do. The main difficulty in hardening a thin blade is to control the temperature uniformly. If file steel is hardened too thoroughly, the blade will be brittle. Reheat it slightly to temper the degree of hardness. Anneal the tip of the tang also.

Repolish the steel with fine abrasive cloth. A final sheen is produced with a buffing wheel, using various grades of powdered pumice stone.

Shaping the Ferrules

The handle is of laminated construction securely held by means of two brass ferrules, or bolsters, at either end of the tang. The ferrules are made of brass bar stock.

The shoulder ferrule is perforated by drilling, chiseling, and filing brass bar stock in successive operations, as indicated in the detail drawing. Small chisels and files are essential. Make a small cold chisel by grinding a discarded nail set or a center punch to shape. Also obtain a double-pointed, auger-bit file.

Carefully fit and hammer an iron spike into the ferrule opening, as a form of shank. Place the assembly in a drill chuck, or in a lathe, and file the bolster to a semi-spherical shape, approximately ½ in. in diameter. Finish it with abrasive cloth. Shape the tang bolster, bearing in mind that its opening is smaller than that of the ferrule.

Laminating the Handle

The handle of the letter opener includes a central grip of hard rubber, bakelite, composition, or plastic in plain, opaque or mottled colors; a series of fiber or leather disks; and a series of brass or copper disks.

Fiber and metal disks are grouped alternately on either end of the grip. The assembly is held immovable on the tang by the ferrules, or bolsters.

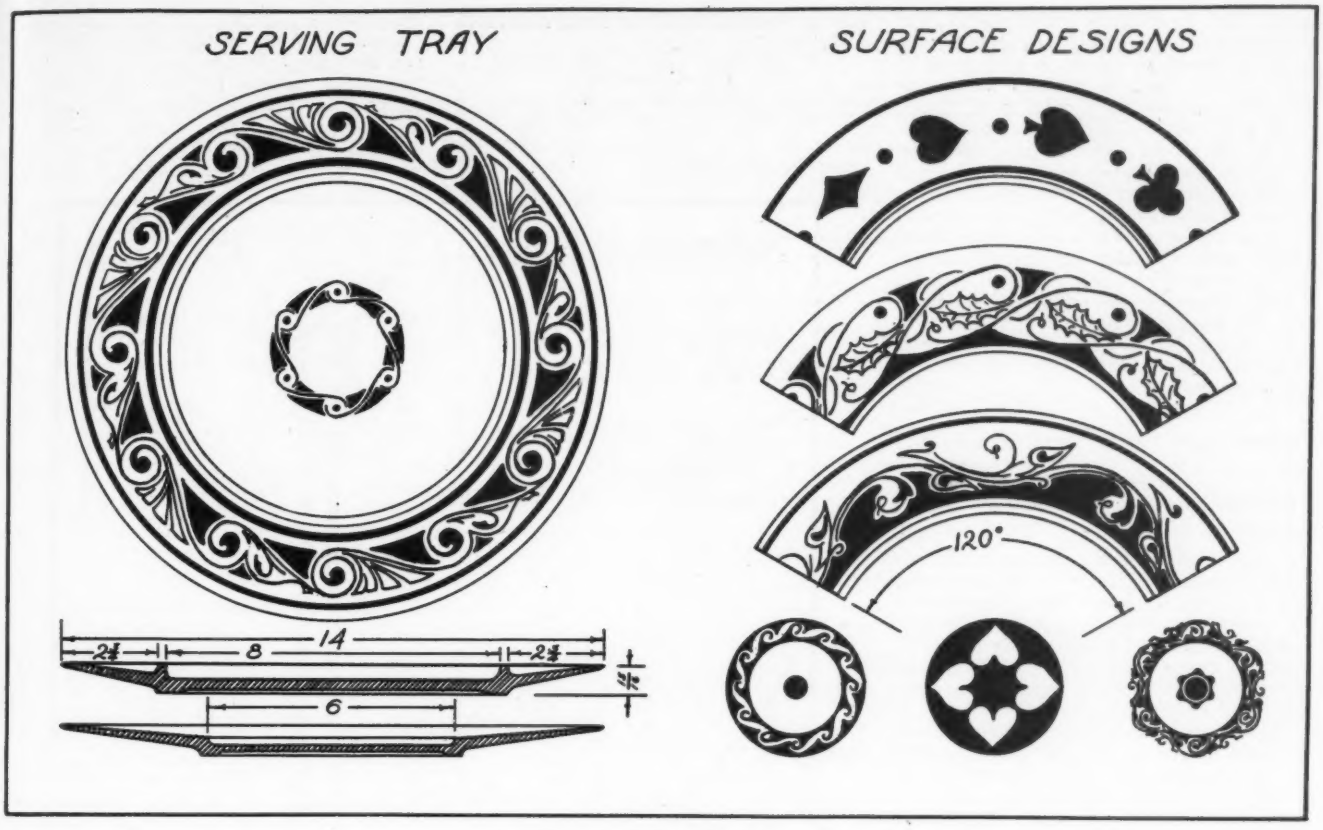
With dividers, scribe eight disks, 11/16 in. in diameter, on a sheet of fiber or leather 1/16 in. in thickness. Scribe eight disks, likewise, on a sheet of 16-gauge brass or copper.

Drill each disk and, with the slender points of a chisel and an auger-bit file, shape each opening to correspond with the size of the tang at the place where each disk is to be located. Since the tang tapers in width, no two openings will be alike. Trim the disks from the sheet with a pair of tin snips.

The central grip may be made of several kinds of material. Obtain a cylindrical piece of either hard rubber, bakelite, or modern plastic, 1½ in. in length and 1 in. in diameter. The original model was made of jet-black hard rubber.

At one end, drill half the length of the axis with a 9/32-in. drill. Drill the other end, likewise, with a 5/32-in. drill, until the bores meet at the center. Whittle a wooden shank and force it tightly into the bore of the cylinder. Place the improvised shank in a drill chuck, or in a lathe, and reduce the grip to a diameter of ¾ in.

Fashion a convex curve, terminating in an



Serving tray designed by W. I. Tawes

abrupt shoulder and concave curve, at each end of the grip, as indicated in the detail drawing. Remove the tool marks with abrasive cloth and steel wool. The surface of certain plastics may be "spirited off" with a cloth moistened in acetone.

The handle is assembled as follows:

Slide the shoulder bolster on the tang, tamp four fiber disks and four brass disks alternately in place, tamp the grip in place, tamp the other brass disks and fiber disks in place, and rivet the tang bolster by means of the annealed tip of the tang.

Polishing Procedure

After assembling the letter opener, there remains the task of reducing the lamination to a uniform diameter and finish. Carefully grind off the periphery of the lamination, reducing the roughness and irregularities. Completely smooth the surface with a trisquare taper file and with abrasive cloth. Keep the grip free of tool marks. The final diameter of the bolsters and the laminated disks is approximately ½ in.

To give the surface of the handle a high polish, utilize various grades of powdered pumice stone, tin oxide, and jeweler's rouge on the buffing wheel. Wipe the letter opener free of dust particles and fingerprints. Finally, apply a thin coat of clear lacquer to the ferrules and lamination before the metal loses its sheen.

SERVING TRAYS

W. I. Tawes,
Public Schools,
Claymont, Del.

The serving or sandwich tray described in this article is rather unique in both general design and treatment. The trays are not difficult to turn and they are excellent motivating projects.

Almost any close-grain wood is suitable for the trays. Red gum, yellow poplar, birch, holly, and maple are excellent woods. If the trays are to be decorated with a carving technique, more valuable woods with beautiful grain and color might be used. Obviously the wood in any case must be thoroughly seasoned and dry and preferably quartersawn. If the stock is not quartersawn it should be cut in strips not more than 3 in. wide and glued carefully together, with the annual rings alternating in direction, until a piece of the desired width is obtained. The stock, ready to turn, need not be over 13/16 in. thick.

Turning Operations: The bottom of the tray should be turned first. When fastening the faceplate upon the stock, which has been cut to rough dimensions with a band saw, the screws should enter only the waste stock which will later be removed. The finished job should show no evidence of screw holes. After the bottom has been turned, sand the surface with No. 0 sandpaper. Before taking from the lathe, strike a circle in the concave section with a hard lead pencil, the same diameter the faceplate block is to be. The faceplate block should be turned next. It should be about 6 in. in diameter and 13/16 in. thick. After the block has been turned, glue it onto the tray bottom, inserting a piece of heavy paper to facilitate removal of the block after the turning operation. Use the circle scribed on the bottom to facilitate the operation of centering the plate accurately. After the glue joint has set for 12 hours or more, the block may be fastened to the faceplate and the face surface of the tray turned. Thoroughly sand the face surface removing all tool marks and scratches.

Surface Enrichment: There are many ways to ennance the beauty of the surface. Bands and figures may be scored with a knife or chisel to prevent bleeding and filled in with oil stain of various colors. Many pleasing effects can be worked out in this manner. The designs suggested were worked out for a pyrographic technique. The mellow, rich tones of brown caused by the burning wood are very effective. The writer has developed a pyrograph that has a point sufficiently hot to burn as fast as the hot point can be conveniently moved. Such a piece of apparatus makes the work of applying designs comparatively easy. With a little patience, the commercial type of pyrograph can also be used to attain excellent results. The same designs may be carved with woodcarver's tools, especially the new type of motorized tools. A carving technique would be very suitable. There is also a chance to experiment with drawing-ink linework, or gold leaf may be used.

Surface Finish: After the decorative techniques have been applied, the tray should be given a finish to protect it and to bring out the natural beauty of the wood. The designs also will be enhanced by this treatment. Again oil stains may be used effectively for color effects besides the use previously given. An excellent treatment for the trays is to heat a large quantity of paraffin wax in a container slightly larger than the trays in diameter. When the wax becomes hot (remember this material is inflammable), the tray should be completely submerged into the hot liquid and allowed to soak in it for a few minutes. The paraffin will penetrate the wood pores

making the wood fibers moistureproof. On removing from this bath, the excess wax should be allowed to run off. A good grade of furniture paste wax should then be applied and polished in the usual manner. A French polish is another fine finish. In this case the tray should not be removed from the lathe until the polishing process has been completed. Finally the trays may be given several coats of spar varnish, rubbing down each coat with No. 2/0 sandpaper or fine steel wool. Water may be used as a lubricant after the second coat has thoroughly dried.

When completed, the trays are very practical for serving sandwiches and drinks to small groups. Standing on their edges on a sideboard or mantel, they are very effective and decorative.

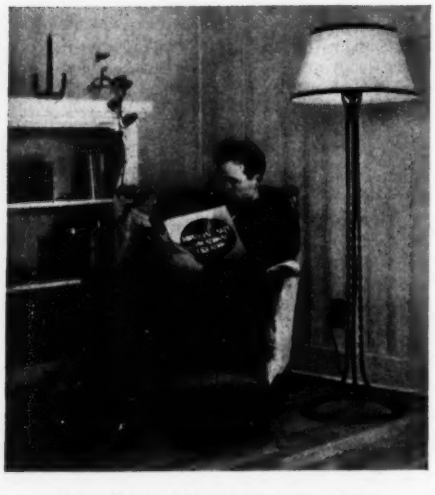
WROUGHT-IRON FLOOR LAMP

Robert P. Jensen,
Kansas State Teachers College,
Emporia, Kans.

A floor lamp of modern efficiency demands the indirect-lighting feature with adjustable light intensity. To meet these requirements the three-speed switch on the mogul-type socket has been developed to give 100, 200, or 300 watts of power. Because this socket with the proper size indirect-lighting globe and the shade make a rather large mass, it is necessary to change from the conventional, one-piece iron lamp post to one of greater size and strength. Not only must this design actually be stronger but it must have the appearance of greater strength to give the proper balance and proportion to the whole unit.

The body of the floor lamp described in this article is constructed from mild steel bar stock. The cost for this mild steel material for the whole lamp is about 60 cents. The cost for the three-speed switch, reflecting globe, and bulb is about five dollars. The shade will cost anywhere from 50 cents to five dollars depending on the quality selected.

The following procedure will be of sufficient detail to enable metalworkers to construct the lamp without further directions. For the beginner in metalwork or for the homecraftsman it is suggested that detailed information concerning metalworking processes be obtained from the book, *Metalwork Essentials*.[1]



Wrought-iron floor lamp designed by Robert P. Jensen

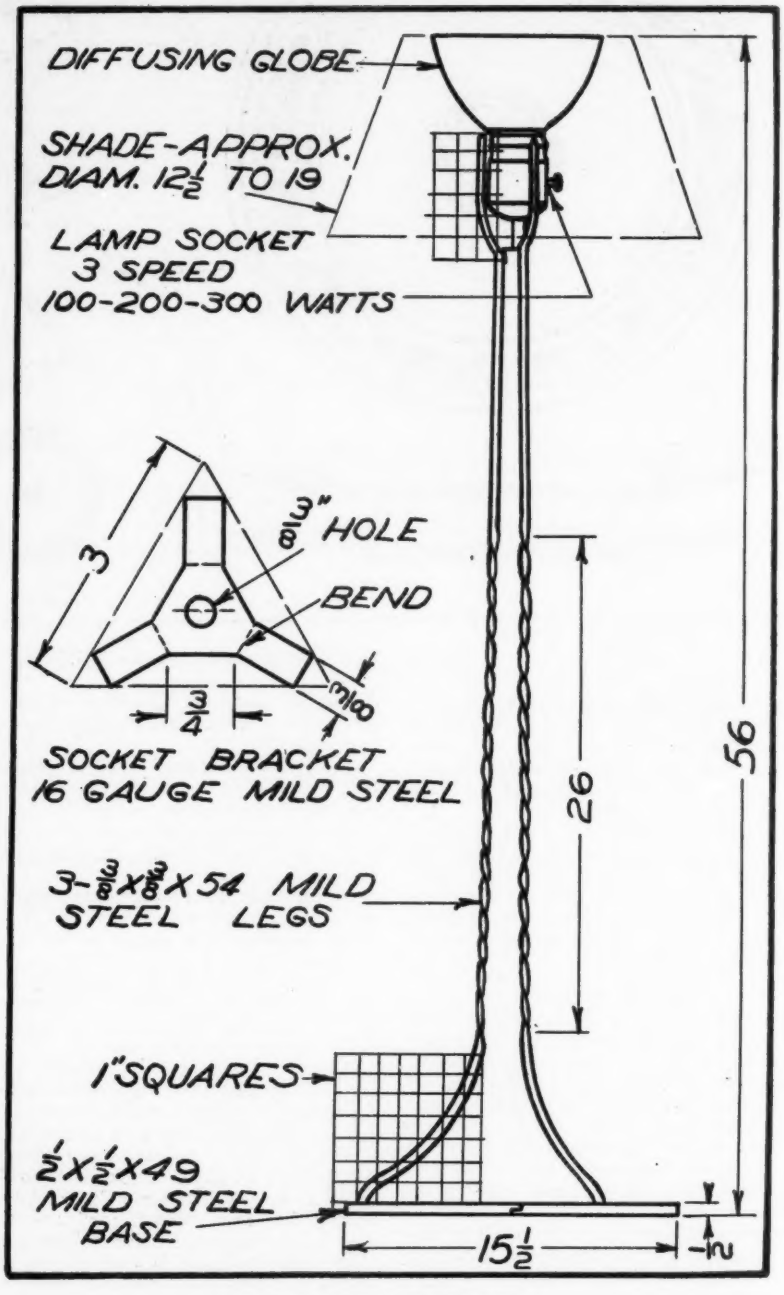
Bill of Material

Base 1 pc. ½ by ½ by 49-in. mild steel
Legs 3 pc. ⅜ by ⅜ by 54-in. mild steel
Socket base 1 pc. 3-in. 16-ga. equilateral mild steel triangle
Rivets 7 pc. 3/16 by 1-in. r.h. soft iron
1 pc. ⅛-in. pipe nipple
1 pc. ⅛-in. lock nut for pipe
1 pc. lamp socket
3 speeds — 100, 200, and 300 W.
1 pc. diffusing globe
1 pc. shade approximately 12½ to 19-in. diameters.

Procedure:

Draw a full-size pattern for the ring base and the curved sections on each end of the legs. This pattern for the legs may be enlarged by squares. Please note that the drawings indicate the curves are to be enlarged by drawing like portions of each section in 1-in. squares. It may be desirable to purchase the lamp socket before making the drawing for the upper leg curve, as there is a slight variation in the size of socket from the various manufacturers.

To put the twist in the leg it is necessary to place a pipe over the twisted section to keep it from buckling.[2] The straight piece must be twisted before the curves are formed



Details of wrought-iron floor lamp

[1] Tustison, F. E., and Kranzusch, Ray F., *Metalwork Essentials* (Milwaukee: The Bruce Publishing Co.).

[2] *Ibid.*, p. 116.

on the ends so that the pipe may be removed. The length of the twisted portion is 26 in. and is started 10 in. from the end of the straight piece.

A hammer marked finish is given to that part of the legs which has not been twisted and to the ring base. Only three sides of the square metal need be hammered as the bottom of the ring and the inner side of the legs do not show.

By the use of a bending fork the legs and ring base are bent to fit the patterns.[3]

[2] *Ibid.*, pp. 118–122.

The hammering, twisting, and bending loosens the black oxide scale and this scale may now be easily removed by using a wire buffing wheel.

If an oxidized rather than a bright finish is desired it is well to apply this finish before the pieces are assembled. The oxidized finish is obtained by coating the pieces with linseed oil and heating the metal, a small section at a time, to bring out the range of temper colors which show up when metals are heated.[4] The twisted portion might be left

[4] *Ibid.*, p. 106.

bright or oxidized as desired. The effect of this finish is improved on hammered work if the high spots are rubbed off with fine emery cloth to bring out the hammered high lights. The lamp shown in the photograph has the hammered, oxidized finish.

The ring base is fastened at the ends with a half-lap riveted joint as shown. The legs are riveted to the base with the head of the rivet inside so that the hammered end of the rivet blends in with the hammered finish on the outer surface of the ring. The legs are riveted to the triangular socket base with the rivet head on the inside so that the hammered rivet end at this construction point will also blend with the finish. If equipment for welding is available a welded construction may be used throughout.

Because mild steel is subject to rust, the most serviceable finish for either the bright or oxidized surface is clear lacquer. Some metalworkers believe that lacquered metals have an unnatural gloss and recommend a wax finish. A wax finish is not nearly so serviceable as lacquer but gives a more natural metal luster to the object.

Attach the lamp socket to the socket base by using a ⅛-in. pipe nipple and lock nut. From 12 to 15 ft. of brown rubber-covered lamp cord will meet most requirements.

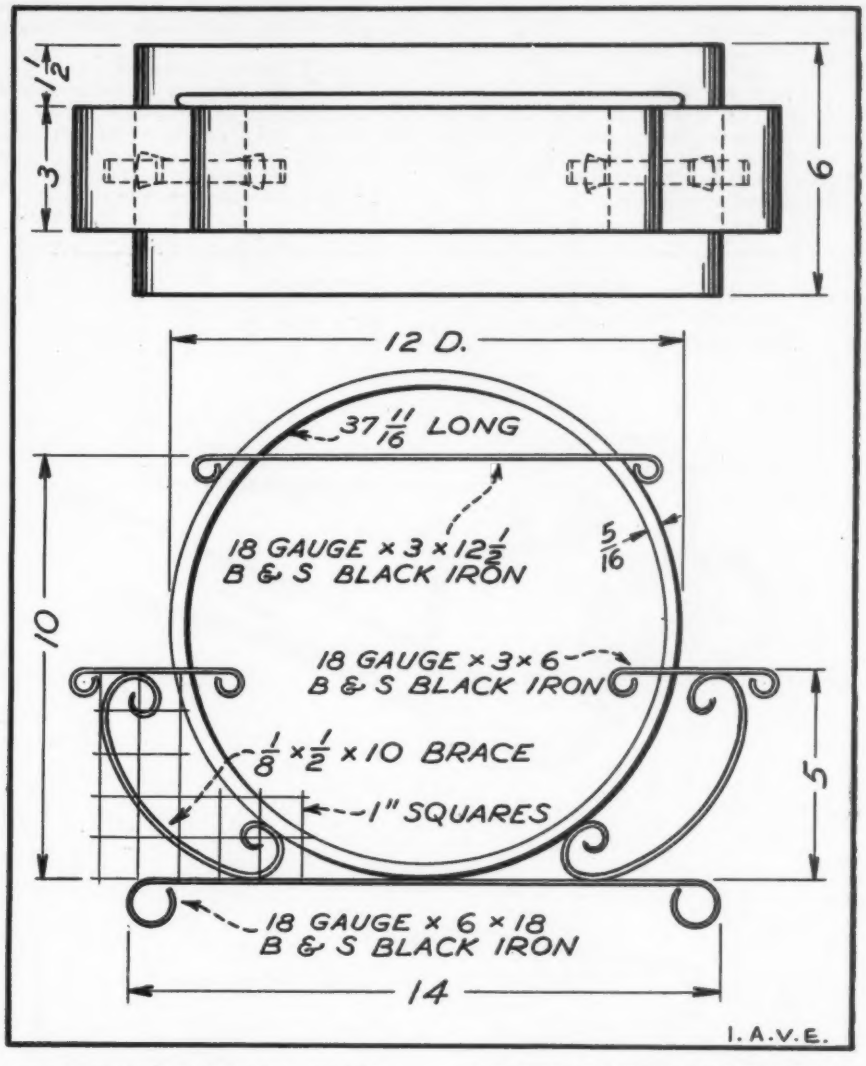
A lamp shade of proper size, in rather plain design, trimmed in black or brown to match the color of the oxidized finish completes the assembly of the lamp.

Never let an opportunity pass to say a kind and encouraging word to or about somebody. Praise good work done, regardless of who did it. If criticism is needed, criticize helpfully, never spitefully.

You and I

If I knew you and you knew me
'Tis seldom we would disagree.
But having not as yet clasped hands
We often fail to understand
That each one tries to do what's right
To treat the other honor bright.
How little to complain there'd be
If I knew you and you knew me.

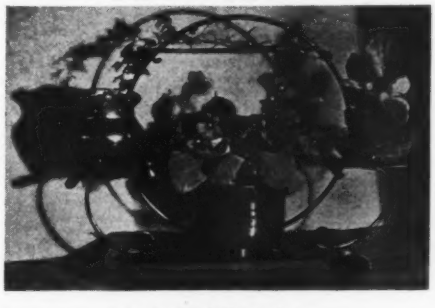
—Source Unknown



THREE-SHELF PLANT STAND

William A. Van Aken,
Canandaigua Academy,
Canandaigua, N. Y.

The project described herewith has won considerable approval from the students in my classes.



Method of Procedure

1. Write up a bill of material.
2. Get out materials needed.
3. Shape the individual pieces.
4. Weld or otherwise fasten the 12-in. ring in place. It has been found convenient to clamp the various parts to a firebrick, if the welding process is used, in order to hold the pieces to be joined squarely in place.
5. Finish with enamel and bronze powder.

INDOOR-GARDEN WATERING CAN

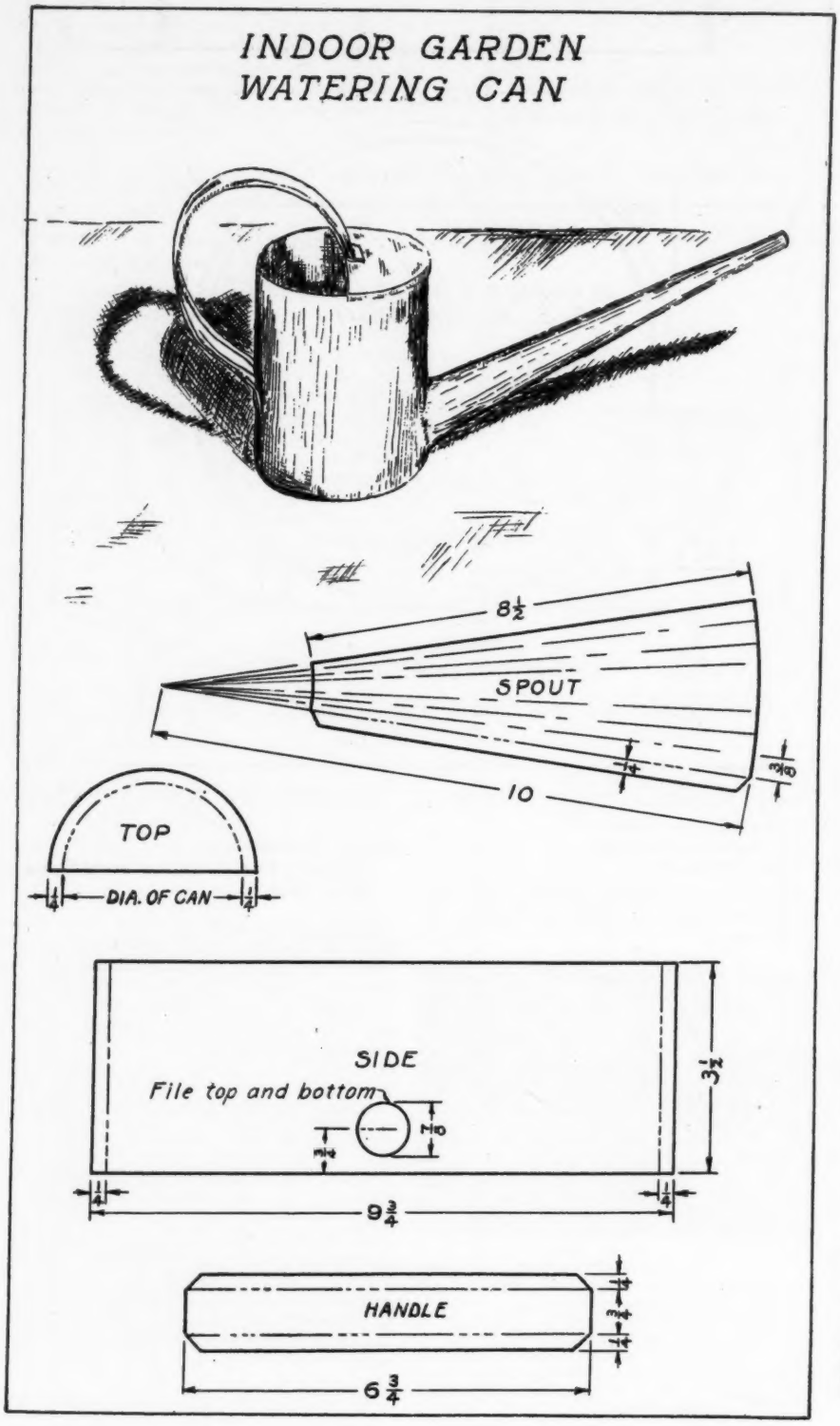
George L. Marsh,
Woodrow Wilson Junior High School,
Tulsa, Okla.

The indoor-garden watering can shown herewith, is quite handy and has the advantage of preventing water from spilling on the floor when watering pot plants. The can may be made of brass, copper, or sheet tin. Beginning students will generally have more success with sheet tin.

Procedure:

1. Lay out the spout on heavy paper and transfer it to the sheet metal.
2. Form the spout on a needle case stake, or on a piece of iron rod turned to the proper taper. Use a mallet when forming.
3. Solder the lap seam securely.
4. Lay out the side of the can on sheet metal and cut it out with tinners snips.
5. Lay out the position of the intersection of the spout on the side. Punch a hole with a hollow punch which measures the same diameter as the spout ¼ in. from the large end.
6. File the hole on the upper and lower edge to allow the spout to be inserted from the back and tilted upward at the end.

7. Fold the hems on the side in the opposite directions.
8. Form the side into a cylinder and hook the hems together.
9. Groove the seam.
10. Place the cylinder on metal and mark the pieces for the bottom and top. Allow ¼ in. on the half-circle top for burring. Cut the bottom small enough to allow for fitting tightly inside the cylinder.
11. Lay out the handle on metal and cut the bottom, top, and handle with tinners snips.
12. Fold a hem on the handle.
13. Make two metal or hardwood blocks the same diameter as the cylinder. Place the top between the blocks in a vise and form the burr with a mallet.
14. Solder the seam on the cylinder.
15. Solder the spout into the cylinder.
16. Fit the bottom disk into the cylinder about ⅛ in. from the bottom edge. Solder the disk to the side with the can inverted. Test the can to see if it will hold water.
17. Solder the top to the cylinder.
18. Form the handle and solder it to the can.
19. Clean excess solder from the joints.
20. Polish all surfaces with fine steel wool.



FOOT-POWERED POTTER'S WHEEL

Harold F. Stegmiller,
Robert E. Smith,
Department of Education,
Ohio State University,
Columbus, Ohio

The making of pottery outdates history. As far back as records go, the potter's wheel was used. Until 1730, nearly all pottery was thrown on the wheel. The early wheels were operated by the potter's hand or foot with the possible exception of those powered by the treadmill. Mechanical power for operating the wheel was probably not used until the latter part of the nineteenth century. Even today one would, no doubt, find more "kick wheels" in use than power wheels. Both power and kick wheels frequently are used in the classroom with many pupils preferring the kick wheel. The advantage of the kick wheel is found in its lower cost and the ease with which the speed can be regulated.

Feeling the need for an inexpensive and practical potter's wheel that could be made in the school or home, the faculty and students in the division of industrial arts at Ohio State University designed and built the kick wheel shown in Figures 1 and 2.

The materials needed for this device may be obtained from the local lumber and auto-wrecking companies. The frame may be made of yellow pine, oak, or other suitable wood, and fastened together with screws and bolts.

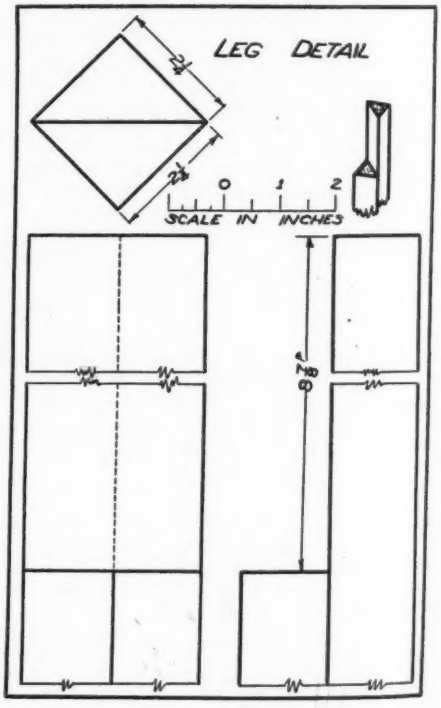


Fig. 3. Leg detail

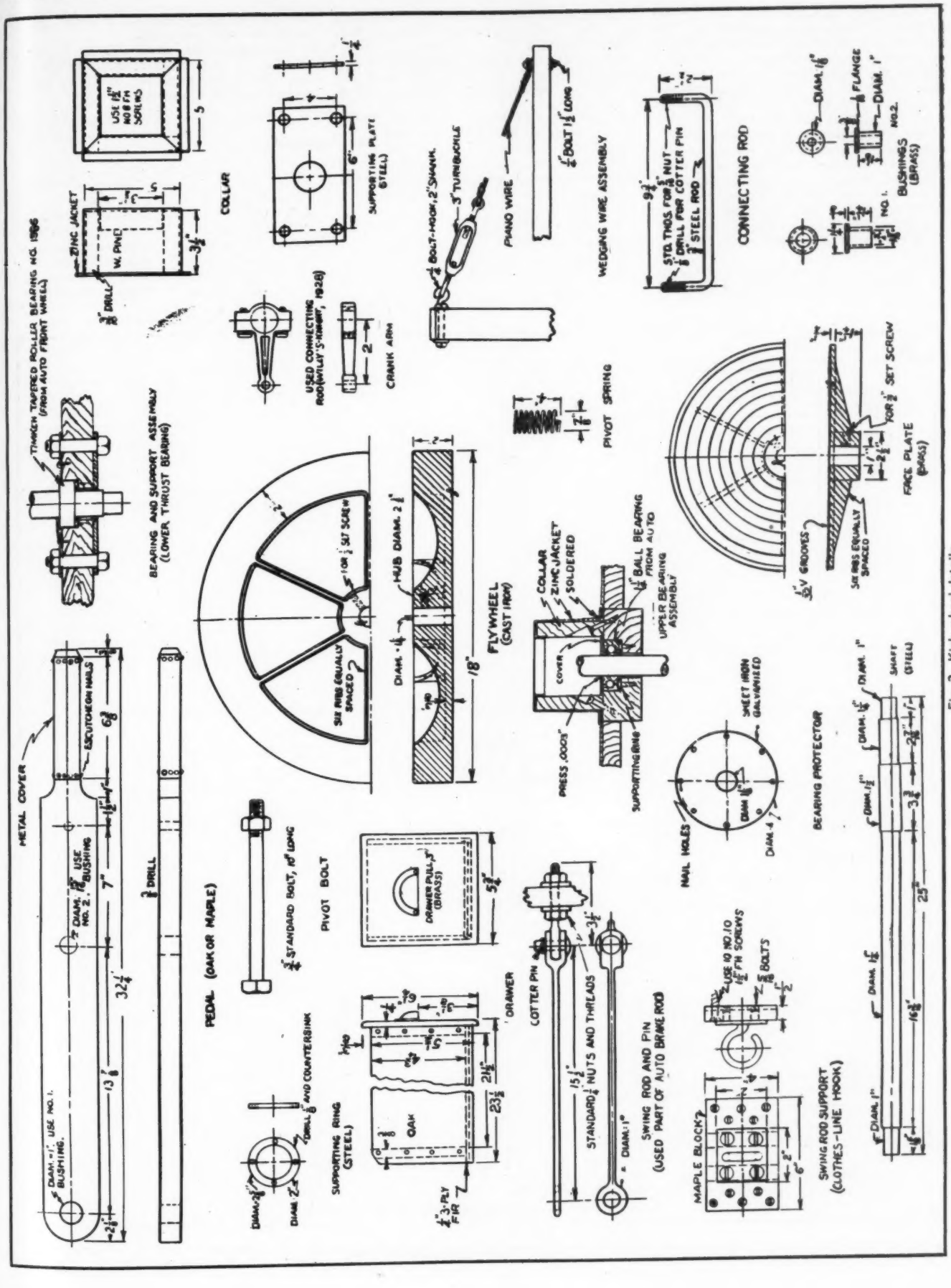


Fig. 2. Kick-wheel details

The bearing, the crank, and swing rod, are old auto parts. If facilities are available, the flywheel may be cast and machined in the schoolshop. Otherwise, the flywheel of an old automobile engine works quite well. The faceplate usually is made of brass or aluminum; although cast iron may be used. The basin of the potter's wheel is lined with sheet zinc with soldered seams to make it watertight. Zinc is recommended because it does not rust or corrode readily. A drawer is provided in the front of the kick wheel for the operator's tools. A wedging wire and bat for wedging the clay before throwing is also provided for. The posts are made of 2¼-in. square stock with half of the top section removed as shown in Figure 3.

The wheel is easily constructed and can be built with the tools usually found in a reasonably well-equipped school shop. In assembling the wheel, care must be taken that the shaft is set vertically.

Figure 4 shows a development of the bottom and sides of the lining. The ends and corners are cut separately; then soldered to the bottom and sides. All soldered joints should be made watertight.

To preserve the wood and to facilitate cleaning, all parts made of wood, except the bat, should be given two coats of paint, preferably dark tan or gray.

Bill of Material

No. Pieces	*Name of Piece*	*Size*	*Kind of Material*
1	Bat	⅞" x 11½" x 24"	White pine
2	Sides	⅞" x 11" x 35"	White or yellow pine
1	End	⅞" x 11" x 24"	White or yellow pine
1	End	⅞" x 11" x 32"	White or yellow pine
4	Legs	2¼" x 2¼" x 34"	White or yellow pine
2	End rails	1½" x 1¾" x 22¼"	White or yellow pine
2	Side rails	2" x 4" x 35¼"	White or yellow pine

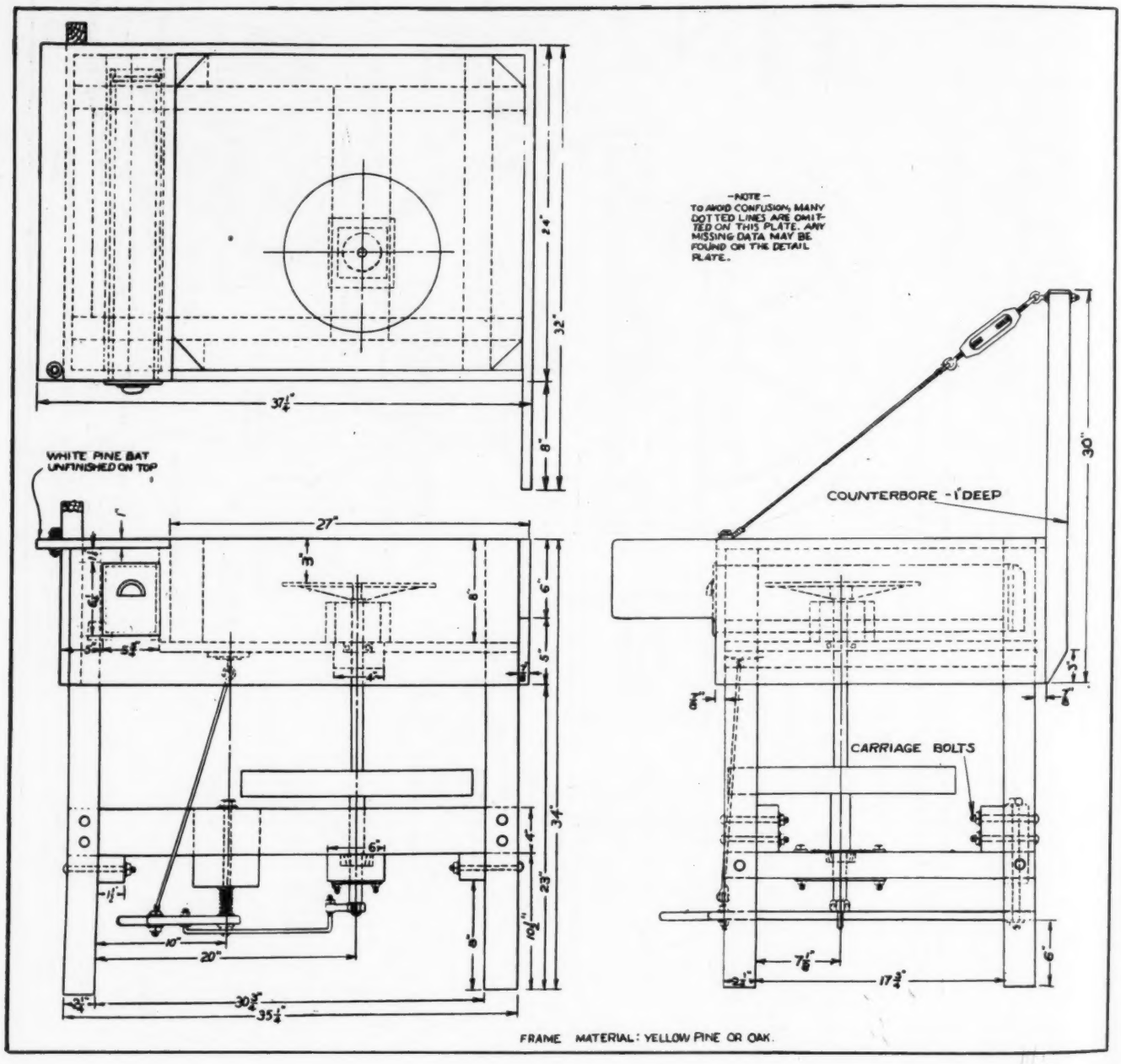

-NOTE-
TO AVOID CONFUSION, MANY DOTTED LINES ARE OMITTED ON THIS PLATE. ANY MISSING DATA MAY BE FOUND ON THE DETAIL PLATE.
WHITE PINE BAT UNFINISHED ON TOP
COUNTERBORE - 1" DEEP
CARRIAGE BOLTS
FRAME MATERIAL: YELLOW PINE OR OAK.

Fig. 1. Kick-wheel assembly plate

No. Pieces	Name of Piece	Size	Kind of Material
1	Top bearing rest	2" x 4" x 22¼"	White or yellow pine
1	Bottom bearing rest	2" x 6" x 17¾"	White or yellow pine
1	Inset end	⅞" x 7½" x 22¼"	White or yellow pine
1	Bottom	⅞" x 12¼" x 22¼"	White or yellow pine
1	Bottom	⅞" x 10" x 22¼"	White or yellow pine
1	Wedging support	1½" x 1½" x 30"	White or yellow pine
1	Pedal	1⅛" x 4¼" x 32¼"	Oak or maple
2	Drawer sides	½" x 5½" x 32¼"	Yellow or white pine
1	Drawer bottom	½" x 5½" x 23¼"	3-ply fir
1	Drawer back	⅜" x 5" x 5"	White or yellow pine
1	Drawer front	¾" x 6¼" x 5¾"	White or yellow pine
1	Pivot block	2" x 6" x 5"	Maple or oak
1	Swing rod support	¾" x 4" x 6"	Maple or oak
4	Sides of collar	¾" x 3½" x 4¼"	White or yellow pine
1	Cold roll shaft	1½" x 25"	
1	Supporting plate steel	¼" x 6" x 8"	
1	Clothesline hook		
1	Steel rod	⅜" dia. 14" long	
1	Auto brake rod and clevis		
1	Auto brake rod and eye		
1	Pivot spring	⅞" x 4"	
1	Brass bushing	1¼" dia. x 1 3/16"	
2	Supporting ring steel	2⅝" dia. x ⅛" thick	
2	Bearing protectors, No. 20 galvanized iron	4" dia.	
	Zinc lining	24" x 78"	
	Zinc lining for collar	5" x 20½"	
1	Cast-iron flywheel		
1	Cast brass faceplate		
1	Auto ball bearing	1¼"	
1	Timkin-tapered roller bearing, No. 1986		
1	1928 Willys Knight connecting rod or equivalent		
1	¾-in. standard bolt	10" long	
1	¼-in. bolt hook	2" shank	
1	3-in. turnbuckle		
1	Drawer pull		
12	Carriage bolts	⅜" x 4½"	
1	Pound escutcheon pins		
3 ft.	No. 20 piano wire		
4	Machine bolts	⅜" x 2¾"	
4	Machine bolts	⅜" x 4"	

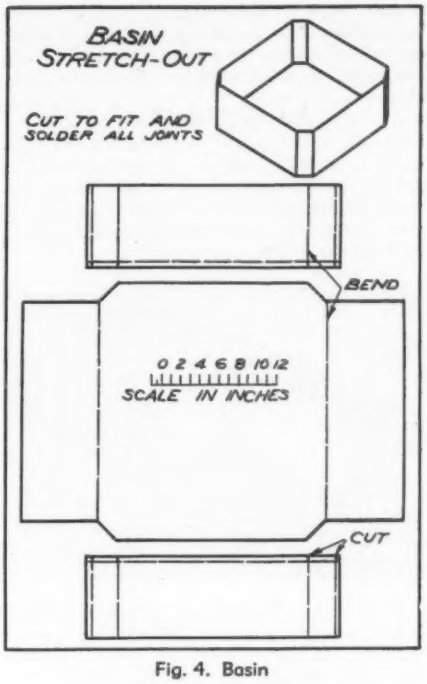


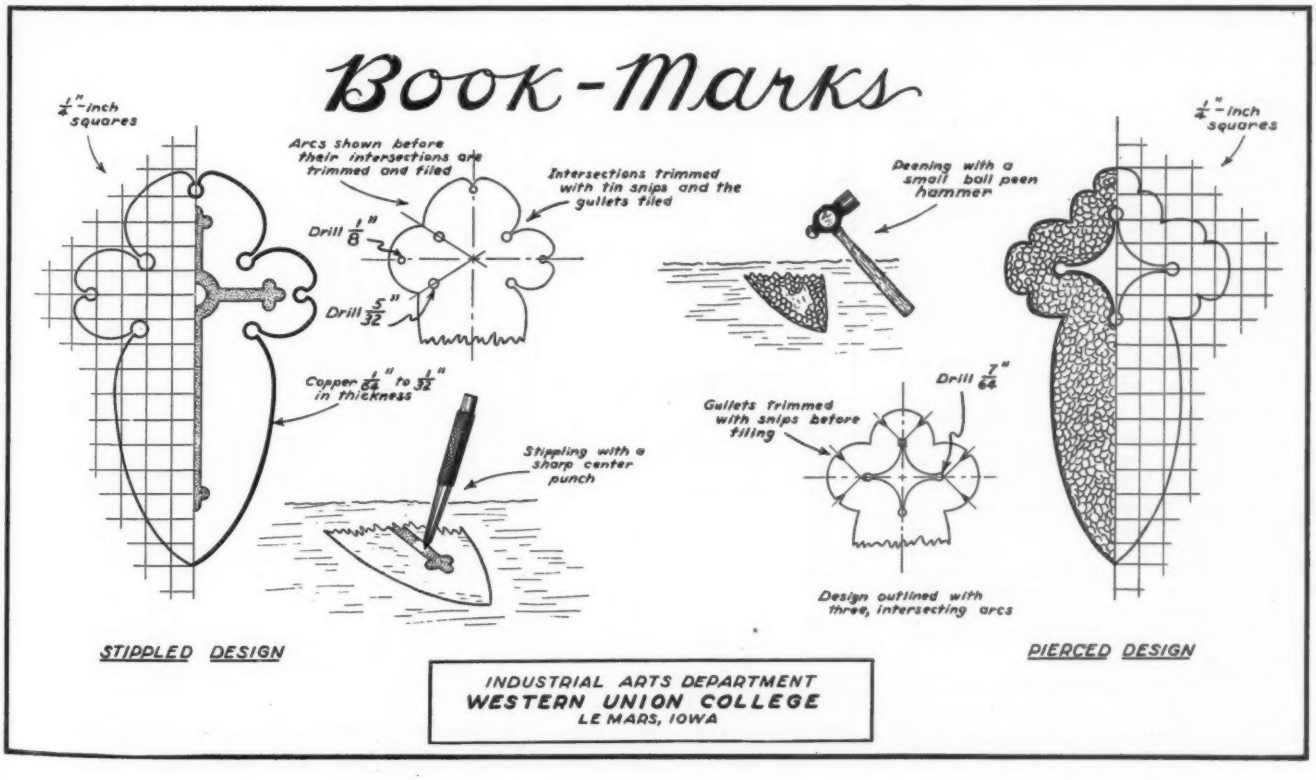
Fig. 4. Basin

COPPER BOOKMARKS

Amos G. Williams,
Western Union College,
Le Mars, Iowa.

These bookmarks represent a unit of metal handicraft that was introduced in a teacher-training course of school art. The members of the class were girl students.

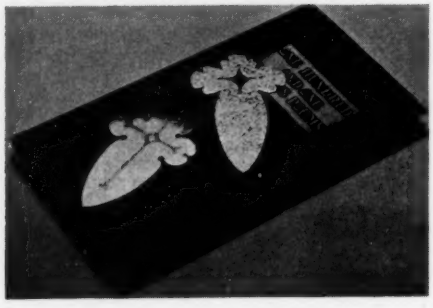
Two designs are submitted: one having a


Book-Marks
¼"-inch squares
Arcs shown before their intersections are trimmed and filed
Intersections trimmed with tin snips and the gullets filed
Drill 1/8"
Drill 5/32"
Peening with a small ball peen hammer
¼"-inch squares
Copper 1/64" to 1/32" in thickness
Stippling with a sharp center punch
Gullets trimmed with snips before filing
Drill 7/64"
Design outlined with three, intersecting arcs
STIPPLED DESIGN
PIERCED DESIGN
INDUSTRIAL ARTS DEPARTMENT
WESTERN UNION COLLEGE
LE MARS, IOWA

stippled effect contrasting with a polished background, and the other having a pierced and peened surface treatment. The bookmarks are made of sheet copper 1/64 in. to 1/32 in. thick.

Scribing Procedure

Sketch both designs on co-ordinate paper, using a compass and a rule to lay out the designs on ¼-in. squares, as shown in the detail drawing. If preferred, the bookmarks may be enlarged one half by sketching the patterns on ⅜-in. squares.



Notice that the head of each bookmark is based on a symmetrical intersection of three circular arcs, the *gullets* of which are subsequently altered by drilling, cutting, and filing. Likewise, notice that the basic outline of a bookmark is composed of five intersecting arcs.

After sketching each design on co-ordinate paper, scribe the five basic arcs on the surface of sheet copper, using steel dividers with sharp points. Take care to avoid scribing lines past the points of intersection. Only new copper stock should be used.

Piercing Procedure

Part of the surface design should be executed before the bookmarks are cut from the copper stock. It is easier to drill and pierce the projects while the copper is yet in one piece. A ⅛-in. drill and a 5/32-in. drill are used to pierce the stippled project, as indicated.

Transfer the central motif from the co-ordinate paper to the copper surface by using carbon paper. Place the copper on an anvil whose surface is "dead smooth" and free of all surface nicks. Grind the point of a center punch to a very acute angle of sharpness. Then, with a lightweight hammer and the center punch, stipple the project as indicated.

A 7/64-in. drill is used to pierce the other bookmark. The center of the design is removed by chiseling the copper away with a small chisel ground from a discarded nail set or center punch. Smooth the inner arcs with a 4-in. tri-square taper file.

Trimming and Filing the Blanks

Trim both bookmarks from the copper stock with tin snips, following the general outline of each. Trim the intersections of the arcs, as shown. Carefully shape the gullets of both projects with a 4-in. tri-square taper file. Likewise, alter the curvature of the lower tip of each bookmark by trimming and filing so that they appear more obtuse.

Lightly chamfer all the edges of the metal by filing and using a fine grade of abrasive cloth.

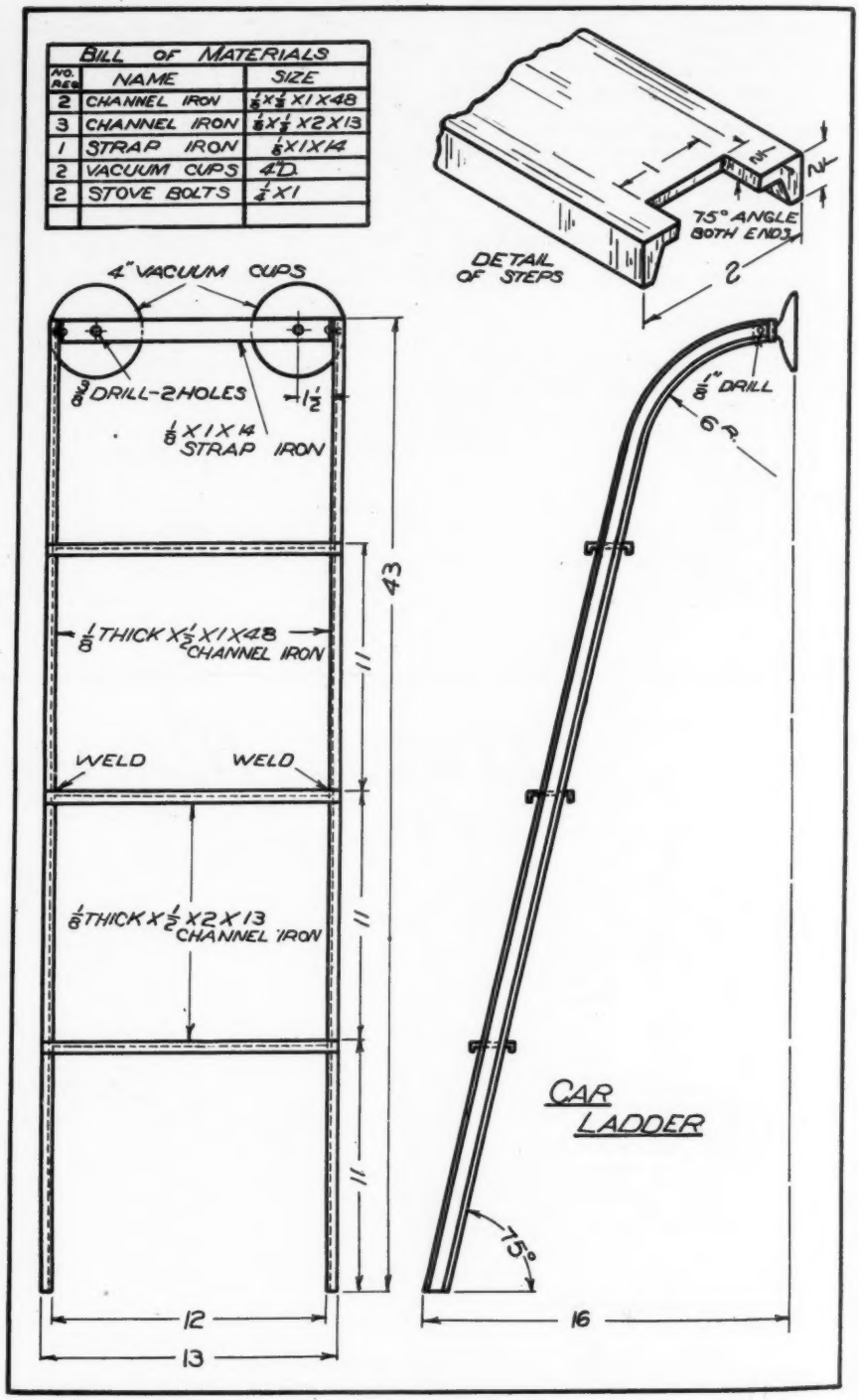
Polishing and Peening Procedure

Small articles of copper have a pleasing appearance when their surface is highly burnished and is lacquered to prevent tarnishing. A satin finish gives larger items an appropriate finish. The bookmarks should be highly polished on a buffing wheel, using pumice stone in cake form. Powdered pumice stone is satisfactory. Use it in various grits ranging from coarse to extremely fine, but not on the same cloth polishing head. Use a separate head for each grit.

After polishing the stippled project, apply a thin coat of clear lacquer that is slightly warmed. When dry, the project is completed.

After polishing the pierced project, peen the surface on one side with an 8-oz. ball-peen hammer. The work must be supported on a dead-smooth anvil, lest the lower surface be marred. Pay close attention to the edges of the metal and let each peen mark overlap its neighbor.

Blows unnecessarily heavy will distort the metal. In any case, the surface will tend to curve, but it may be straightened by tapping it with a smooth mallet or even with a hammer. Repolish both sides of the bookmark with pumice stone and wipe it free of dust particles. Lacquer the project before the copper loses its sheen.



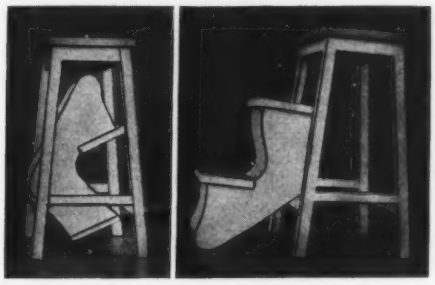
Car ladder designed by Arthur F. Schuster, South Junior High School, Niagara Falls, N. Y.

KITCHEN STOOL

Ray Treasure,
Senior High School,
Richmond, Ind.

The kitchen stool described herewith is comfortable when used as a seat and makes a safe stepladder when used to reach high cupboards.

This stool is a very desirable project for any woodworking class in junior or senior high school. It is also a practical and interesting project for the homecraftsman who has a minimum amount of power-driven machines. The construction of the stool involves not only the squaring of stock to dimension, but also laying out and cutting of mortises and tenons, resigning and band-sawing of pieces for steps, using dowel rods, locating and driving screws, setting machines for angles other than 90 deg., nailing, boring holes for dowels, assembling, and finishing.

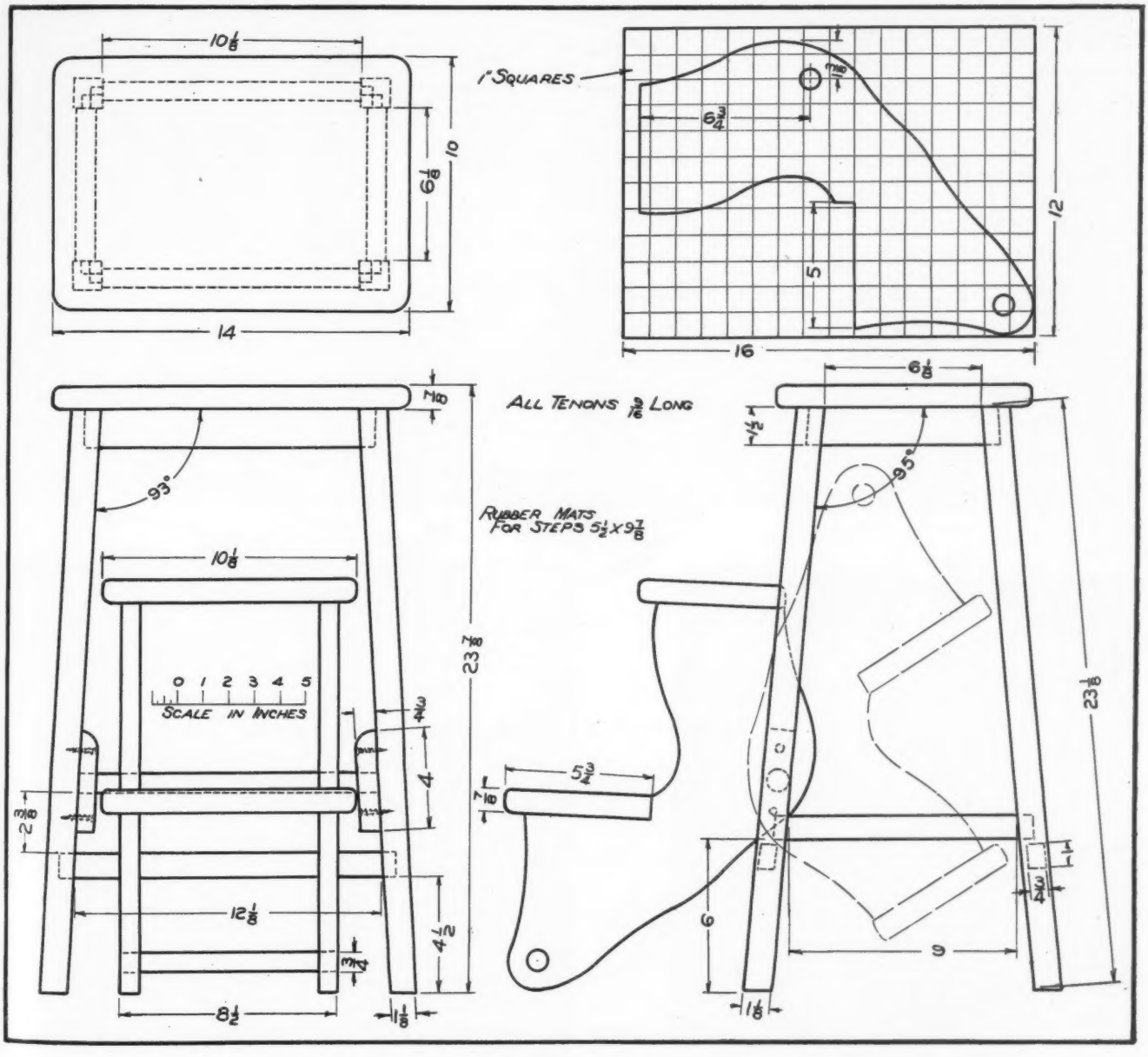


Combination stool

The wood used in making the stool should be one of the hardwoods, such as beech, maple, ash, and oak. Poplar makes a strong stool and is used where a stool is wanted that is light in weight.

The order of procedure for constructing the stool is as follows:

1. Square legs and rails to measurements (use correct angles for ends of rails).
2. Glue boards to make top, or square piece of solid stock if a 10-in. board is available.
3. Lay out and band-saw pattern for horses.
4. Square steps to dimensions.
5. Turn dowel rods, or purchase ⅝- or ¾-in. birch rods from local lumber company.
6. Square filler blocks.
7. Lay out and cut mortises and tenons.
8. Assemble legs and rails.
9. Fasten top to lower frame.
10. Assemble ladder by nailing steps to horses and insert lower dowel rod in place.
11. Fasten filler blocks in place by driving top screws only.
12. Pull out filler blocks, insert dowel through filler block, then through holes in steps, and second filler blocks.
13. Fasten filler blocks securely at bottom with screws.



Combination stool

14. Locate steps and drive brads through dowel rod to keep steps in place.
15. Glue rubber matting to steps.
16. Prepare surface by sanding.
17. Finish with paint and enamel.
18. Round rubber feet may be used on the bottom of the leg.

The following bill of material gives the measurements of all pieces of stock and sizes of screws and nails.

Bill of Material

Legs, 4 pcs.	1⅛ by 1⅜ by 23⅜ in.	
Top, 1 pc.	⅞ by 10 by 14 in.	
Top side rails, 2 pcs.	¾ by 1½ by 11 5/6 in.	Includes tenons
Top end rails, 2 pcs.	¾ by 1½ by 7¼ in.	Includes tenons
Bottom side rails, 2 pcs.	¾ by 1 by 13¼ in.	Includes tenons
Bottom end rails, 2 pcs.	¾ by 1 by 10¼ in.	Includes tenons
Pieces for horses, 2 pcs.	¾ by 12 by 16 in.	(A piece of stock 10 by 18 in. may also be used)
Pieces for steps, 2 pcs.	¾ by 5¾ by 10⅛ in.	
Filler blocks, 2 pcs.	¾ by 1⅜ by 4 in.	
Dowel rods, 1 pc.	¾ by 8½ in.	
1 pc.	¾ by 11¾ in.	

4 Rubber feet, ⅞-in. half-round screw-on pads (for legs)

2 Rubber feet, ¾-in. half-round screw-on pads (for steps)
8 Screws, No. 8, 2-in. f.h.b.

4 Screws, No. 8, 1½-in. f.h.b.

12 Nails, 7d. common box

4 Nails, 5d. finish

2 Rubber mats, 5½ by 9⅞ in.

1 pt. flat white paint

½ pt. 4-hour white enamel

No special spinning tools are required. The two broom handles shown in Figure 3 are all that is required for the forming of this project. The rounded end of the one is used to form the tray depression, as shown in

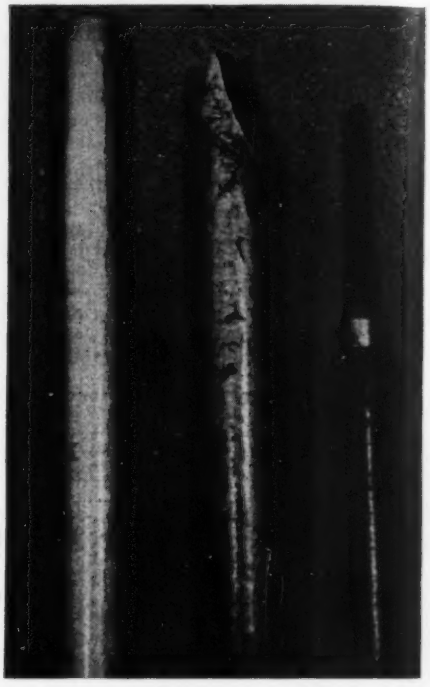


Fig. 3. The spinning tools used

SPUN MINT TRAY

Harvard Leighton,
Leominster, Mass.

The tray described herewith has been found well within the ability of students from the ninth grade.

The working drawing of both tray and handle are shown full size for the convenience of the student or craftsman.

The working drawing of the spinning rest, shown in Figure 12, is added so that the craftsman in the home workshop may make one if he does not have one already. A rest of this kind is essential for proper spinning.

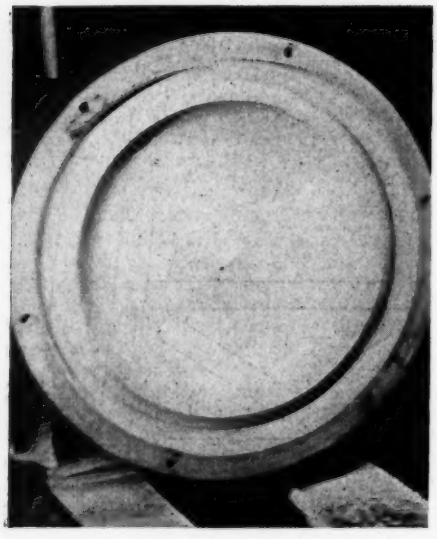


Fig. 2. The form turned and mounted

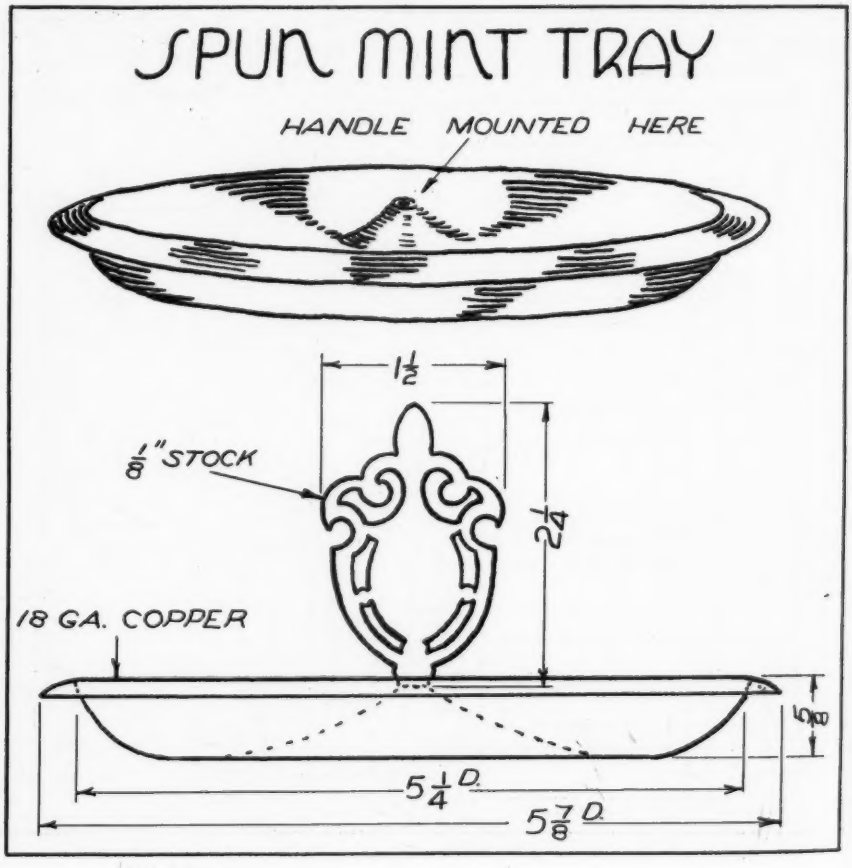


Figure 4. The wedge-shaped broom handle in Figure 3 is sawed to shape and used to turn the rim. Figure 5 shows how this is done.

The wedge will have to be kept sharp while turning the rim.

Stock

1 pc. 18-gauge copper or brass, 9 in. square; 1 pc. ⅜ by ⅝ by 3¼-in. copper or brass for handle.

Form

2 by 9 by 9-in. hard maple. ¼ cup of boiled linseed oil for finish, bunch of waste to apply oil.

Tools

Turning gouge, skew chisel, hand drill, two drills (5/32 and ⅛ in.), compass, screw driver, six ¾-in. r.h. No. 12 screws, 2/0 garnet paper, 10-in. mill file, broomstick 30 in. (birch), jewelers' saw frame and one half dozen No. 2 saws, soldering copper, paste, solder, pencil, tracing paper, glue, spinning rest.

Fig. 1. The tray

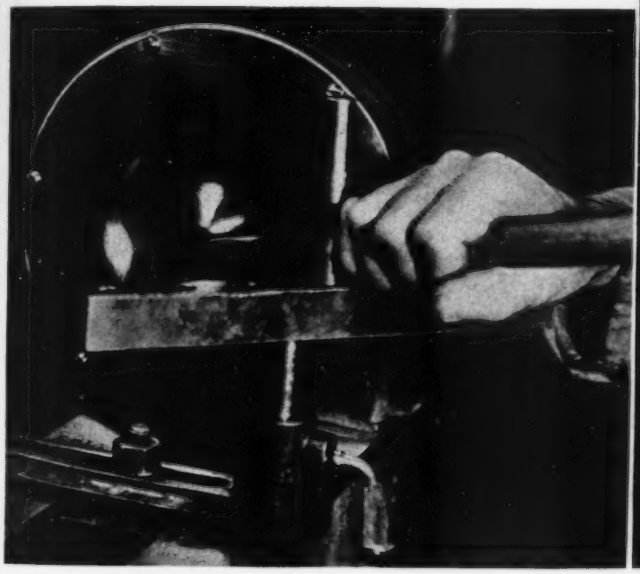


Fig. 4. Spinning down inside

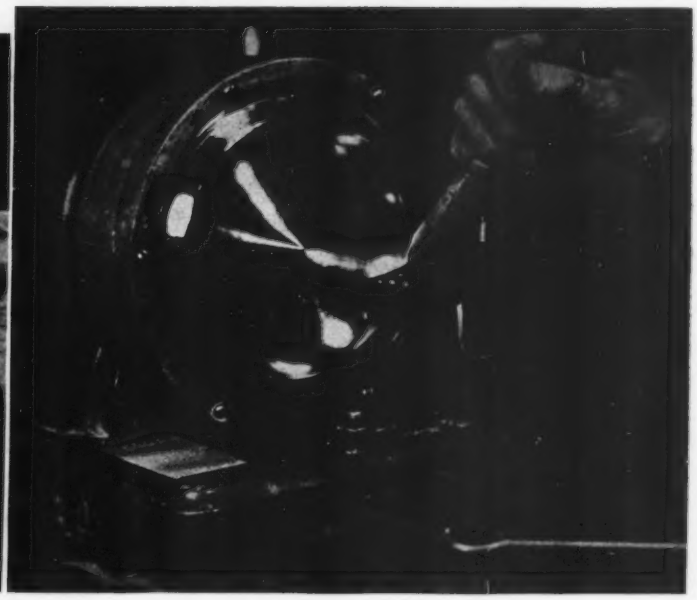


Fig. 5. Turning the rim

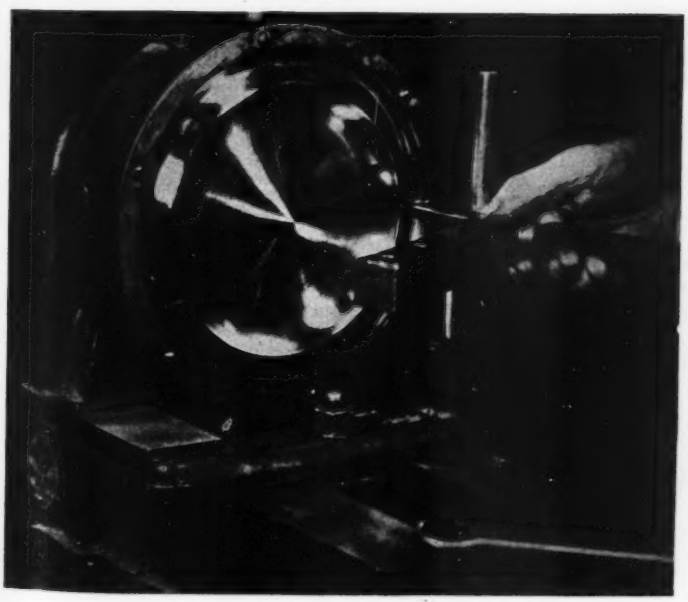


Fig. 6. Cutting tray free

Fig. 7. Removing the tray

Lubricant

One half bar of yellow laundry soap chipped fine and ¼ cup of No. 40 motor oil. Melt to soupy consistency. This lubricant is used in this spinning operation; other types are used for different metals.

Machine

The special metal-spinning lathe made by the Oliver Machinery Co., or the heavier bench lathes manufactured by Delta Mfg. Co., Walker-Turner Co., Crescent Machine Co., and the Yates American Machine Co., may be used for spinning this and other projects.

Cleaning Materials

One cup of vinegar; ½ cup salt; 1 tablespoon flour pumice.

Finish

Metal polish, Simonize, Johnson's or any good wax.

Form

1. Cut 2-in. block of hard maple, 8¾ in. in diameter, on the handsaw.
2. Mount on faceplate and screw latter on lathe.
3. Turn form as shown in Figures 1 and 2, and sand smooth. Speed 1200 r.p.m.
4. Finish surface by applying several coats of boiled linseed oil with cloth while the form is rotating.
5. Score a line ¼ in. from the circumference all the way around the block with a skew chisel.
6. Divide the scored line into six equal parts by stepping off the radius on the scored circle, with the dividers.
7. Drill 5/32-in. holes at each of the points thus located for No. 12¾-in. r.h. screws.

Tray

1. Cut a disk, 8¾ in. in diameter, and scribe a circle ¼ in. inside the circular edge.
2. Divide scored circle on disk into six equal parts to coincide with that of form.
3. Drill disk at these points to take No. 12 r.h. screw.
4. Attach disk to form with No. 12 by ¾-in. r.h. screws.
5. Mount spinning rest in position about 2 in. away from form as shown in Figure 4.
6. Set pin in rest so that stick used to

(Continued on page 20A)

Fig. 11. Evolution of tray

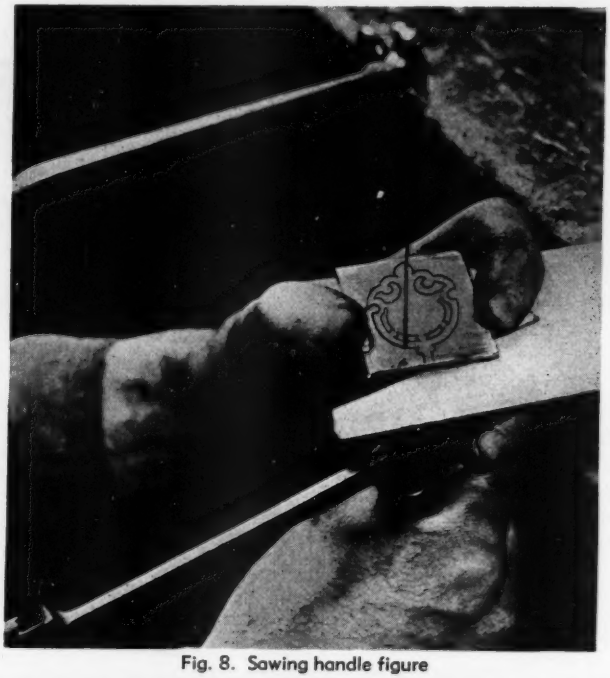


Fig. 8. Sawing handle figure

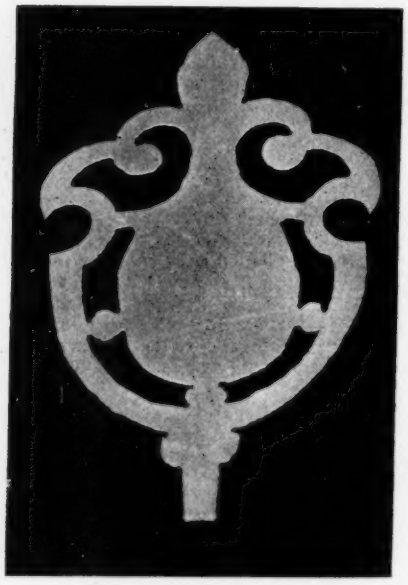


Fig. 9. Examples of handles

Fig. 10. Soldering handle to tray

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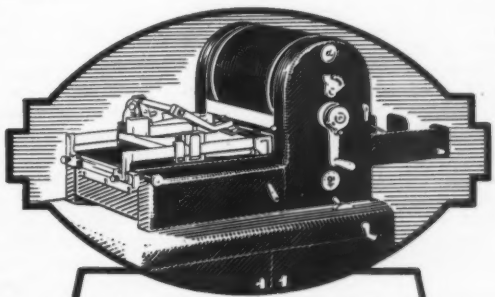

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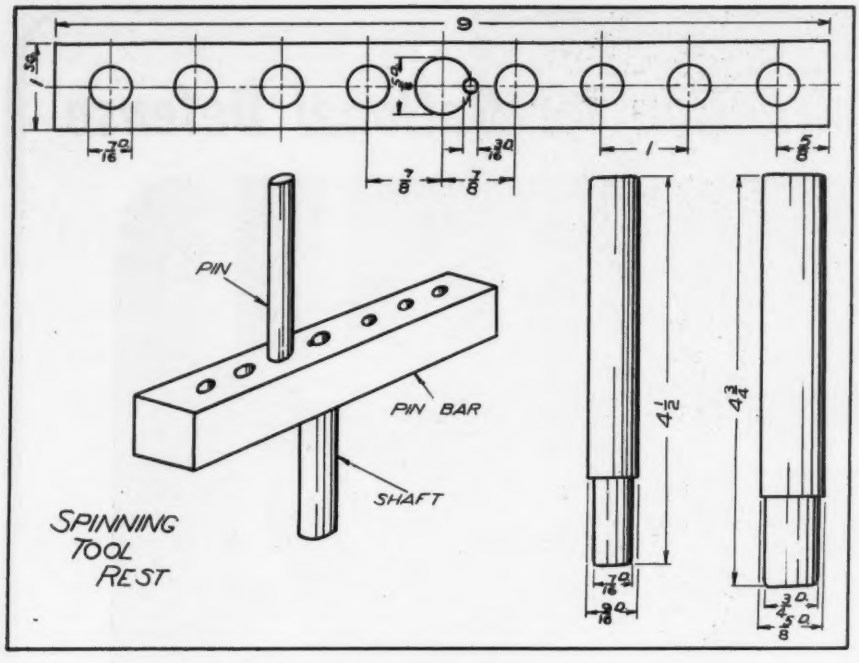

Fig. 12. Spinning-tool rest

(Continued on page 364)

form copper is playing about 4 in. from contact of copper to pin on rest.

7. Use hardwood broom handle cut about 30 in. long, and use the round end to do the spinning operations, shown in Figure 11.

8. Set speed of lathe to about 1200 r.p.m.

9. Spread a thin film of prepared lubricant over the surface of mounted disk.

10. Start applying pressure at the center of the disk with rounded-head stick. Always work from center outward to circumference, as shown in Figure 4.

11. Figures 4 and 5 show the development of the disk as the spinning progresses.

NOTE: It will be necessary to anneal the disk two or three times to get the inside spun. To turn the edge it will require annealing at least two more times. Anneal by heating to cherry red and dousing in cold water.

Be sure to mark the disk and the form so that the latter may always be returned to the same position each time.

12. Cut the end of the broom handle opposite to the rounded end to the wedge shape shown in Figure 3.

13. Turn edge of disk with this wedge-shaped stick, as shown in Figure 5.

14. Sand with No. 2/0 garnet sandpaper to emphasize spinning lines.

15. Move tailstock of lathe in position to bring dead center to bear on center point of disk to prevent disk from falling and becoming dented when it is cut. Score and cut with a small skew chisel, as shown in Figures 6 and 7.

16. Clean with salt and vinegar, mixed to a soup consistency.

Holder

1. Trace design shown, or develop one of your own and glue tracing to material.

2. Set jewelers' saw blade No. 2 in frame with teeth pointing toward handle. (Use wax on blade to prolong its life.)

3. Use a V-cut board clamped or screwed to the bench as shown in Figures 8 and 9, to make it easier to saw the figure.

4. Saw carefully to obviate filing. Use No. 2 needle files to smooth the edges if that is necessary.

5. File spur round.

6. If design is to be etched on handle, it should be done at this time.

Assembly

1. Drill ⅛-in. hole in center point of dish to fit spur of handle.

2. Tin soldering copper.

3. Apply solder paste to back of dish and tin.

4. Put figure in vice with spur upright. Place dish so that spur comes through to back of dish, as shown in Figure 10. If vice is not available, the handle may be soldered as shown in the illustration.

5. Hold dish with cloth or paper while soldering spur in position, as it may become too hot to hold if some protection is not used.

6. Clean all parts with metal polish and wax. Slightly warm dish before wax is applied.

The Tool Rest

A tool rest such as the one shown in Figure 12, is very necessary for spinning metal. The one shown is made of cold rolled steel. It may be made according to the following method of procedure.

1. Clamp the 1-in. square bar in the vise and smooth its ends with a smooth file. Surface the sides of the square with the long faces.

2. Round edges slightly with a smooth file to remove any sharp burrs.

3. Locate position for all holes to be drilled. See Figure 12 for locations.

4. Prick punch the centers. Use a tempered punch and be sure that the holes are made exactly where the lines cross or the drilled hole will not be in the center.

5. Drill holes for the pins with a 7/16-in. high-speed drill. Use machine oil for lubricant to prevent burning the drill.

6. Drill hole for shaft in center. Proceed as with other drilled holes, use ⅝-in. drill.

7. File burrs off with fine single-cut file.

8. Next turn up the shaft to the dimensions given. It must be made to fit the tool-rest holder on the spinning lathe. Smooth with two grades of emery cloth.

9. Place this rod in position in the ⅝-in. hole of the pin bar, and drill the 3/16-in. hole 1 in. deep for the locking pin. Be sure to center it on the circumference of the shaft fitted into bar.

10. Drive the locking pin into hole. File off all protruding metal of the shaft and pin with fine file.

11. Turn the pin to the dimension shown in Figure 12. It should fit the pin hole with a comparatively loose fit for easy removal of pins but the pins should not vibrate. Round off the top and bottom edges smoothly.

PERSONAL NEWS

♦ O. B. BADGER, director of vocational education of the public school system, Portland, Ore., has been made assistant superintendent of that system. He will have direct supervision of the defense training program, the technical high school, adult education, and vocational education in general.

♦ STANLEY J. PAWELEK has been appointed supervisor of vocational-industrial education in Baltimore, Md. Mr. Pawelek has been doing graduate work on the doctoral level at the Pennsylvania State College, State College, Pa., during the past year.

♦ ALEXANDER A. BLACK, instructor in printing at the New York School of Printing from 1926 to 1941, died last April. His ability and fine personality endeared him to both students and co-workers.

♦ S. L. COOVER, director of industrial education, State Teachers College, California, Pa., was awarded the doctoral degree at the University of Pittsburgh in June, 1941. The subject of his dissertation was "The Nature and Measurement of Mechanical Ability."

During the past summer session Dr. Coover taught several industrial-arts courses at Northwestern University, Evanston, Ill.

♦ HERB HEILIG has resigned as director of the Appleton Vocational and Adult Education School to assume the position of grand secretary of the national fraternity of Sigma Phi Epsilon.

Mr. Heilig was director at Appleton since 1924.

♦ CARL G. BERTRAM, co-ordinator of trades and industry at the Appleton Vocational and Adult Education School has been made acting director of that school, to temporarily fill the position made vacant by the resignation of Mr. Herb Heilig, former director.

♦ JOHN E. CRAWFORD, psychologist of the Downtown Y.M.C.A. of Pittsburgh, has just earned his doctoral degree. His dissertation was entitled "Measurement of Some Factors Upon Which is Based Achievement in Machine Detail-Design Drafting."

♦ JAMES BIGNELL, formerly superintendent at Denton, Neb., has been elected professor of industrial arts at Nebraska Wesleyan University, Lincoln, Neb.

♦ GLENN O. TROGDON, industrial-arts teacher at Gering, Neb., has tendered his resignation there to accept the position of metalwork teacher at the Woodrow Wilson School, Tulsa, Okla. Mr. Trogdon started and developed the general shop at Gering in 1938. During the three years which he has been in Nebraska he has served twice on the state nominating committee, once on the state's work planning committee for industrial arts, once as sectional chairman of District No. 6, Nebraska Industrial-Arts Teachers Association, and at the time of leaving the state was serving the second term as Secretary-Treasurer of the Nebraska Industrial-Arts Teachers Association.

♦ CHARLES G. HEWETT, State Youth Administrator for Maine, on military leave of absence

(Continued on page 22A)

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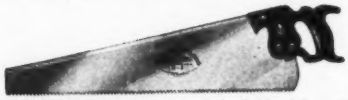
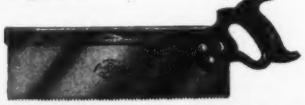


D-7 REGULAR PATTERN, Straight-back Hand Saw. 20, 22, 24 and 26 inches. Also made in Lightweight Pattern, length 26".



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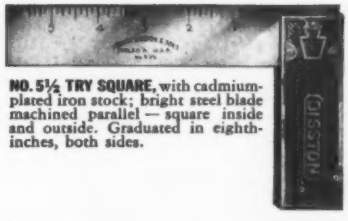

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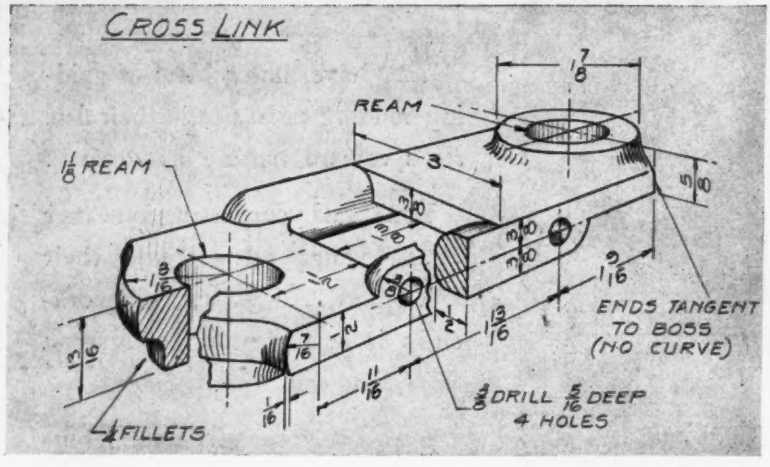

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(Continued from page 20A)

as an officer of the Maine National Guard, passed away on July 25, 1941.

♦ HUBERT Y. ATHERTON, of Albuquerque, was appointed State Youth Administrator for the National Youth Administration of New Mexico. The appointment is effective July first. He succeeds Tom Popejoy, who resigned to accept a post with the University of New Mexico.

♦ ROBERT A. GISH of Laramie, Wyo., was appointed State Youth Administrator for Wyoming, effective June 16, 1941.

♦ GLEN DAVID BROWN, of Baltimore, was appointed State Youth Administrator of the National Youth Administration of Maryland, effective June 16. Mr. Brown succeeds Ryland Dempster, resigned.

♦ G. M. MACMILLAN of Butte, Mont., was appointed State Youth Administrator for Montana effective July 1, 1941. Mr. MacMillan succeeds James B. Love, resigned.

♦ DR. W. T. SPANTON, for the past 16 years federal agent for agricultural education in the Pacific region, was appointed Chief of the Agricultural Education Service, U. S. Office of Education, Washington, D. C. He succeeds J. A. Linke, who has held this position since 1934 and whose retirement from service was effective March 31.

ASSOCIATION NEWS

AMERICAN VOCATIONAL ASSOCIATION CONVENTION

When American Vocational Association members visit Boston on December 10 to 13, 1941, for their annual convention, they will have the opportunity of seeing trade schools on a 24-hour schedule in the heart of industrial New England.

Although the defense program had turned out many thousands of trained workers up to the end of its first year of extra effort, it has not been at the expense of regular vocational education. In Massachusetts alone, 23,957 extra students within the year boosted the total enrollment of its vocational schools to 44,211.

More than 3000 public school and vocational administrators and teachers, seeking counsel on the many new developments that already have presented serious problems for public education, are expected to attend. Members of the Massachusetts Vocational Association will be hosts to the national group of which L. R. Humphreys, of Utah State Agricultural College is president and L. H. Dennis, of Washington, D. C., is executive secretary. President Philip J. Spang of the Massachusetts Vocational Association, is the convention chairman.

Defense training procedures will be presented before each of the several vocational divisions, including group meetings in agricultural, business, distributive, home economics, industrial arts, industrial education, guidance, and rehabilitation.

Vocational training for defense will also be the main topic for consideration in Boston by the annual meeting of the National Association of Directors of Vocational Education on December 8 and 9.

THE CLEVELAND CONFERENCE ON PRINTING EDUCATION

"The most outstanding conference of the 20 held thus far" seems to be the unanimous verdict of the 300 who attended and took part in the 20th Annual Conference on Printing Education held at the Hollenden Hotel and the Board of Education, Cleveland, Ohio, June 29–July 2, 1941. Much credit is due to Chester A. Lyle, the sixth president of our National Association, who gave most faithful service during the past year to the general work of the association and to the planning and direction of the Cleveland Conference. Special praise must be given to Michael J. Eck, our newly elected vice-president for working out the various details of a conference that consisted entirely of headline features. From then on it is hard to particularize as there were so many of our Cleveland members and friends who gave excellent cooperation, but I think all of them would agree that John E. Fintz and Frank C. Moore of the Cleveland Board of Education, and Harry A. Porter of Harris-Seybold-Potter Co. (one of our loyal industry sponsors), deserve special mention. Then we should not forget the unusual support given by all of the printing teachers of the Cleveland public school system, who remained in Cleveland to take part in the conference program and to serve on the various conference committees, notwithstanding the fact that the schools had closed down for the year about the middle of June.

Exhibits and Special Printings

At the outset, too, prominent mention ought to be given the Conference Committee for the special educational treat in presenting for the first time commercial exhibits. The exhibitors were: American Type Founders Co., Chandler and Price Co., Cleveland Typothetae Assoc., Hamilton Mfg. Co., Harris-Seybold-Potter Co., J. A. Richards Co., Manual Arts Press, and Turner Type Founders Co. The exhibits were intermingled with exhibits of school and association printing and placed very attractively in the hotel assembly room where the meetings were held. Exhibits of teaching tools, which figured in the talks and demonstration of the Cleveland printing teachers, were displayed with good effect in the auditorium of the Cleveland Board of Education.

Real initiative and originality were shown in the designing and make-up of the official program which took the shape of the old Stephen Daye press. The program for the conference dinner was cleverly designed also in keeping

(Continued on page 24A)

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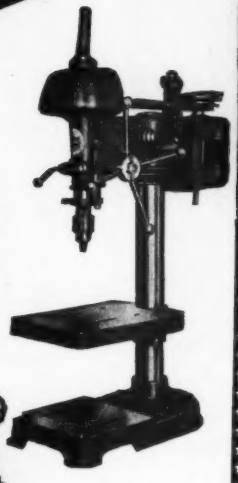

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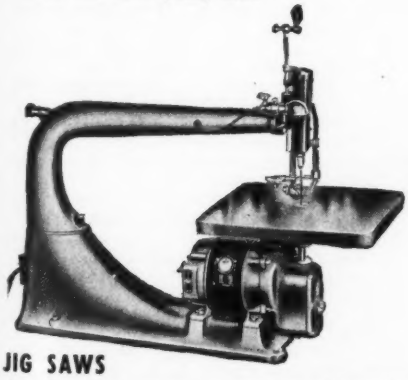

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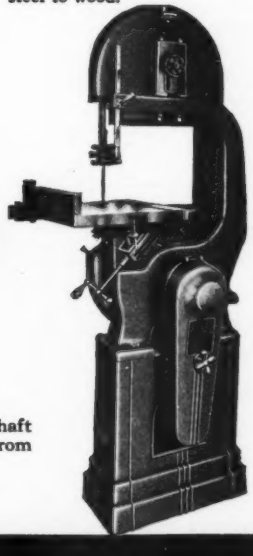

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(Continued from page 22A)

with the patriotic theme. Instead of the regulation conference badge, the printer's stick, with the delegate's name set in type was the device used as a lapel identification card. Two printing students from the Cleveland schools were on hand with a small press and type, and filled in the names of the registrants. The registration packet contained some very fine pieces of printing including a facsimile of illuminated page of the Gutenberg Bible executed and donated by the Apprentice School of the Government Printing Office and a large wall card of the Declaration of Independence, the work of the late Horace Carr.

The annual conference keepsake, the sixth in the series, prepared and donated by C. Harold Lauck, Journalism Laboratory Press, Washington and Lee University, Lexington, Va., was distributed at the conference dinner. It was a small booklet entitled "The Printer's Type," the text of which was written in 1919 by Abe Abrams, one of our charter members, who was then teaching printing in Cleveland.

A Conference of High Lights

It is usually rather easy to single out the high lights of an annual conference and build the conference story around them. But in looking back over the past conference there seems to be only one fair method for adequate reporting and that is to tell the story of each session. Each one was a feature session. So here goes as briefly as possible.

The Opening Session

In planning the program some doubted the feasibility of a Sunday evening session, but after the meeting was over everybody agreed that the new venture in program building was a decided success. At the precise moment at which the meeting was scheduled to begin, local chairman Eck called the meeting to order and presented the presiding officer, Chester A. Lyle. This precedent of beginning on time was carefully followed throughout the conference.

The opening feature was the IPI movie "More Than Meets the Eye," which was very well received. Then followed an address by Alfred Howell, directing supervisor of art, Cleveland public schools on "Printing in Education — Expanding Horizons." An equally stirring address under the cryptic topic, "Why Not," by Professor Otto Ege, Cleveland School of Art, raised some provocative questions why printers should not emphasize more strongly function and content and adopt modern typographical developments.

The concluding feature was a very timely motion picture, "Youth Marches On." This was shown through the courtesy of the Graphic Arts Association of Grand Rapids, Mich. A running story of the picture was given by Arthur E. Ormsbee, Commonwealth Printing Co., Grand Rapids.

The Monday morning session was opened with an invocation, pronounced on this occasion by Msgr. Joseph F. Smith, Pastor, St. John's Cathedral, Cleveland. President Lyle then presented the following who extended greetings: Dr. Charles H. Lake, superintendent, Cleveland public schools; Harold W. Hill, president of the Cleveland Typothetae Association, and Charles Scraff, president of the Cleveland Club of Printing House Craftsmen.

The response to the greetings was made by the educational director who took the occasion to give a brief historical survey of the 20 annual conferences held thus far, pointing out the effect of the educational program upon the printing teacher, upon education, and upon the graphic arts industries. "A Message to the Conference," sent by E. E. Sheldon, adviser to the training department, Lakeside Press, Chicago, and affectionately known as the Dean of Graphic Arts Education, was made a part of the response.

Special attention was given to the keynote address by Harry L. Gage, vice-president, Mergenthaler Linotype Co., Brooklyn, N. Y., and chairman, Advisory Council on Graphic Arts Education, on the topic, "The Place of Graphic Arts Education in a Program for Common Defense."

The Monday afternoon session was presided over by Vice-President Hupp E. Otto. Michael J. Eck, supervisor of printing instruction, then gave his address on "The Graphic Arts Laboratory vs. Traditional Printing." Then in quick order, 15 of the Cleveland printing teachers presented the various phases of instruction as follows:

Bookbinding — George J. Bilsey, East High School.
Linoleum Block — Wm. Scott, Wm. Dean Howell Junior High School.
Silk Screen Printing — Wm. P. Hoffman, Wilbur Wright Junior High School.
Papermaking — Sidney S. Schusterman, Addison Junior High School.
Hand and Pen Lettering — Robert A. Lias, Audubon Junior High School.
Duplicating Processes — T. M. Brennen, East Technical High School.
Hand Printing Press Projects — C. A. Whittier, Alexander Hamilton Junior High School.
Consumer Advertising — Howard Hout, Thomas A. Edison School.
Consumer Layout Work — N. C. Ribich, Wilson Junior High School.
Color — Edw. M. Page, West Technical High School.
Photography — S. A. Yuhas, Thomas Jefferson High School.
Vocational Information — D. W. Van Kannel, James F. Rhodes High School.
Printing Costs — C. A. Doubler, Glenville High School.
Foremanship Training — E. H. Reuter, West High School.

The Monday evening session was presided over by Harold H. Kirk, Langley Junior High School, Washington, D. C.

The theme of the meeting was "The Arts and Crafts in Modern Living." The main speaker was John A. Backus, manager of the Educational Department, American Type Founders, Inc., on the topic "The Evolution of a Craft." This was an illustrated talk, tracing the early origin

(Continued on page 27A)

(Continued from page 24A)

of printing from the prehistoric days down to the modern printing methods and processes. This is a worth-while lecture that ought to be given in student assemblies and at printers' meetings in all parts of the country.

Chairman Kirk then spoke on "The Explanation of a Craft Today." The following students gave interesting reports of how student club activities are carried on in their areas:

Richard Krause, Johnstown High School, Johnstown, Pa. (J. B. Coyle, sponsor).

Lyle Shearer, Timken Vocational High School, Canton, Ohio (Chester A. Lyle, sponsor).

Steve Elek, East Technical High School, Cleveland, Ohio (C. B. Hurst, sponsor).

Tom Land, Art-Printers Club, Masonic Home and School, Fort Worth, Tex. (Fred W. Miller, sponsor).

Henry Dietrich, East High School, Cleveland, Ohio (George J. Bilsey, sponsor).

Awards to the winners of the four national contests conducted among the student clubs during the year were announced and presented. The contests and the awards were:

1. Scrapbook Contest: Some dozen and more handsomely designed and bound books were judged by Mac Sinclair, editor, *Printing Equipment Engineer;* Alfred Howell, directing supervisor of art, Cleveland public schools; and Professor Otto Ege, Cleveland School of Art; resulting in the award of handsomely printed certificates of merit furnished by the American Type Founders (taking the place of the silver cup awarded in former years.)

First place Junior High School Group — The Addison Junior High School, Cleveland, Ohio, Sidney Schusterman, sponsor.

First place Senior High School Group — The Berea Foundation High School, Berea College, Berea, Ky., Nathan R. Walters, sponsor.

First place Vocational School Group — El Paso Technical Institute, El Paso, Tex., William Van Gasbeek, sponsor.

Colored ribbons, books donated by Mergenthaler Linotype Co., and subscriptions to the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine were given to the winners. These were:

Junior High Schools:

Second — Franklin Printers Club, J. C. Murphy Junior High School, Atlanta, Ga., E. V. Harris, sponsor.

Third — Jefferson Intermediate School, Detroit, Mich., Edward W. Kurtz, sponsor.

Fourth — The Explorers' Club, Masonic Home and School, Fort Worth, Tex., Roy U. Lane, sponsor.

Senior High Schools:

Second — Mergenthaler School of Printing, Baltimore, Md., Allan Robinson, sponsor.

Third — Timken Vocational High School, Canton, Ohio, Chester A. Lyle, sponsor.

Fourth — Art-Printers Club, Masonic Home and School, Fort Worth, Tex., Fred W. Miller, sponsor.

2. Membership Card Contest:

Vocational High School level:

First — Art-Craft Club, Mergenthaler School of Printing, Baltimore, Md., Allan Robinson, sponsor.

Second — Timken Graphic Arts Society, Timken Vocational High School, Canton, Ohio, Chester A. Lyle, sponsor.

Third — The Art-Printers' Club, Masonic Home and School, Fort Worth, Tex., Fred W. Miller, sponsor.

Senior High School level:

First — Central Graphic Arts Club, Central High School, Kansas City, Mo., Arthur E. Harley, sponsor.

Second — The Masonic Home Graphic Arts Club, Masonic Home and School, Fort Worth, Tex., Clarence B. Worsham, sponsor.

Third — Fort Smith Graphic Arts Club, Fort Smith Senior High School, Fort Smith, Ark., C. H. Tobler, sponsor.

Junior High School level:

First — The Langley Printers Club, Langley Junior High School, Washington, D. C., Harold H. Kirk, sponsor.

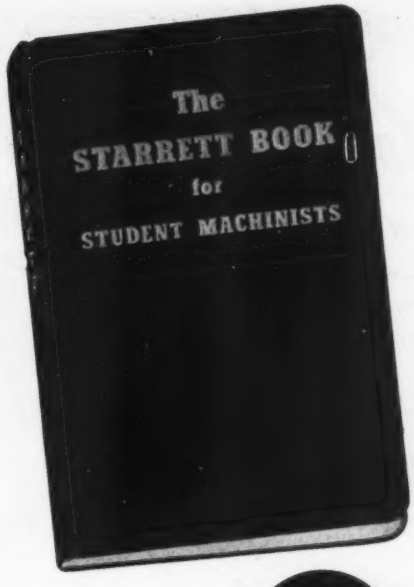
Second — Franklin Printers Club, J. C. Murphy Junior High School, Atlanta, Ga., E. V. Harris, sponsor.

Third — Explorers' Club, Masonic Home and School, Fort Worth, Tex., Roy U. Lane, sponsor.

3. Club Crafter Cover Contest:

Timken Graphic Arts Society, Timken Vocational High School, Canton, Ohio, Chester A. Lyle, sponsor.

4. True Story Contest — The Tramp Printer: Ray Coulter, Masonic Home and School, Fort Worth, Tex., winner.



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Here's a brand new, up-to-the-minute Starrett Book combining the popular Vols. I and II of the famous Starrett Books — The Starrett Book for Machinists' Apprentices (Vol. I) and The Starrett Machinists' Data Book (Vol. II), selling edition after edition *at 75 cents each.* Now, the two volumes are combined, improved and brought up to date as a single volume which sells for the same price as one of the earlier editions — *only seventy-five cents.*

This new Starrett Book will prove an invaluable instruction manual and ready-reference handbook. From cover to cover, it has been revised, reviewed and approved by leading vocational training experts. It is written in clear, simple shop language, profusely illustrated and completely indexed.

Printed on high grade paper and bound in sturdy, soil-resisting Terek Cloth, The Starrett Book for Student Machinists contains 184 pages, 200 diagrams and illustrations and 30 valuable reference tables. It is available now through distributors of Starrett Tools.

Partial List of Contents

How to Read Working Drawings
Measuring Practices
Precision Tools
How to Read a Micrometer
How to Read a Vernier
Facts about Fits
Limits of Tolerance
Bench Work
Chipping and Filing
Metal Cutting
Drilling
Lathe Work
Screw Threads
Tapers
Tool-Making
Jigs and Fixtures
Grinding
Setting Up Machinery
Mensuration
Mechanics

184 PAGES
Over 200 DIAGRAMS and ILLUSTRATIONS
30 REFERENCE TABLES

THE L. S. STARRETT CO., ATHOL, MASSACHUSETTS, U. S. A.
World's Greatest Toolmakers
Precision Tools . Dial Indicators . Ground Flat Stock . Hacksaws . Metal Cutting Bandsaws . Steel Tapes

Tuesday Morning, July 1

This meeting, presided over by President Lyle, was in the nature of a progress report by the Research Project Committee.

Professor Glen U. Cleeton, head of the department of printing, Carnegie Institute of Technology, Pittsburgh, Pa., the chairman of the committee, told of the preliminary work done, and outlined the procedure to be followed by pointing out the fundamental steps in scientific study and offering the following subdivisions of the problem under study:

(*a*) What is there to teach — known skills and information?

(*b*) What graphic-arts skills and information should be taught in public schools?

(*c*) Why teach the skills and information selected?

(*d*) Where and when should each set of skills and each block of information be taught?

(*e*) How should they be taught?

(*f*) By whom should they be taught?

(*g*) To whom should they be taught?

(*h*) What equipment, text material, and teaching skill is necessary to teach the material selected?

(*i*) Do we have the equipment, text material, and teacher facilities for teaching the material selected?

(*j*) What is a reasonable pupil-teacher ratio at various levels?

(Continued on next page)

HERE'S THE GUN USED IN INDUSTRY!

Train Your Students How to Use It—

● Industry needs skilled men—men trained to use the equipment that's on the job. In industries where vital defense materials and products for normal needs are built, the spray-painting equipment is predominantly DeVilbiss.

That's why every modern vocational school needs a painting department—why every shop should be equipped with DeVilbiss spray-painting equipment.

Make your training more useful on the job. Teach your students the function and operation of the DeVilbiss System. Because wherever wood, metal or ceramic products are finished they'll find DeVilbiss Equipment in use.

A DeVilbiss representative, experienced in equipping industrial and trade shops, will be glad to help you modernize your shop.

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Canadian Plant: WINDSOR, ONTARIO

Get this Practical Training Help, Too! Write for a free copy of "The ABC of Spray-Painting" with factual data in question-and-answer form about the operation of spray-painting equipment.

DE VILBISS SPRAY SYSTEMS

(Continued from previous page)

(*k*) What is being taught now at various levels in the public schools?

Chairman Cleeton then introduced the members of the committee — all of them in teacher-training work on a college level. Each gave an interesting summary of the study, based upon analysis of the filled-in questionnaires that had been received. Milo T. Oakland, Northern Illinois State Teachers College, De Kalb, Ill., and Anthony T. Stavaski, State Teachers College, California, Pa., reported on the replies of questionnaires from Junior High Schools; William R. Baker, Stout Institute, Menomonie, Wis., and John C. Tranberger, Indiana State Teachers College, Terre Haute, Ind., reported for the Senior High Schools; Leroy Brewington, Kansas State Teachers College, Pittsburg, Kans. (Merritt Haynes, director of vocational studies, Elizabeth, N. J., was not present) covered the replies from the Vocational Schools.

The conference then divided into three group sessions — Junior High School, Senior High School, Vocational School — for consultation with the members of the committee and for general discussion of the details of the research project. As could be expected, the group discussions were lively and it was difficult to break them up for luncheon.

The Tuesday afternoon session was presided over by Allan Robinson, principal of the Ottmar Mergenthaler School of Printing, Baltimore, Md.

Frank C. Moore, director, industrial arts, Cleveland public schools, the first speaker, spoke on the general topic "The Place of Visual Aids in the Instructional Process."

R. Reuter, teacher, Lincoln High School, gave in detail how slides and films are used as lesson material, under the topic, "An Experiment in the Development of Slides and the Use of Films." "The Use of Field Trips to Supplement the Classroom Work," was discussed in similar detail by H. A. Biggin, teacher, Fairmont Junior High School, Cleveland.

Original devices for taking attendance, for term assignments, for courses of study, methods of testing, for controlling the flow of jobs in the shops, and for checking up on the use of tools by students were covered in an interesting manner by A. Grooves, West Technical High School, Cleveland, under the heading, "Classroom Procedure."

The Conference Dinner on Tuesday evening was presided over by John E. Fintz, directing principal, Special Schools and Vocational Education, Cleveland public schools.

Designed primarily as a patriotic celebration, the after-dinner program started with the presentation of the American and the Canadian flags. Thomas Roy Jones, president of the American Type Founders, was the donor of the American flag, Charles R. Conquergood, president of the Canada Ink Co., Toronto, the donor of the Canadian flag.

Tom Land, a student of the Masonic Home and School, Fort Worth, Tex., then read his prize-winning essay in the IPI contest on "Printing . . . the Safeguard of Democracy."

George Welp of the International Printing Ink Division of the Interchemical Corp., New York City, made a very fitting address in presenting the IPI silver cup to Principal Allan Robinson of the Ottmar Mergenthaler School of Printing, Baltimore, Md., which school submitted the best printed essay in last year's contest.

The climax of the speaking program was the forceful and scholarly address on "Patriotism and Printing Education" by Dr. Charles H. Lake, superintendent, Cleveland public schools.

The closing session was presided over by Chairman Lyle. A. T. Stavaski, State Teacher's College, California, Pa., spoke on the "Modern Method for Handling Production Problems," and Harry A. Porter on "Up-To-Date Information on Lithography."

"Promoting the Vocational High School Through the Establishment of an Advisory Committee," the topic assigned to R. Randolph Karch, principal, Printing High School, Cincinnati, Ohio, was handled in his usual capable manner. He distributed his address in printed form, limiting himself to calling attention to the organization and workings of the Advisory Council for his school and the tentative objectives for graphic-arts education set up for discussion by the Council.

Douglas McMurtrie, typographic counselor, Ludlow Typograph Co., Chicago, chairman of the education commission, International Association of Printing House Craftsmen, made a strong plea for closer cooperation with the craftsmen program of education.

J. Henry Holloway, principal of the New York School of Printing, then gave a "Summary of the Conference with Recommendations and Conclusions" as the closing feature of the regular program.

Executive Session

At the call of President Lyle the conference then went into executive session.

The following is a complete roster of the officers elected for 1941–42:

President: Hupp E. Otto, McKinley Trade School, Wheeling, W. Va.

Vice-president: Michael J. Eck, Cleveland Board of Education, Cleveland, Ohio.

Secretary: C. S. Romig, Altoona Senior High School, Altoona, Pa.

Treasurer: Vincent C. Coyne, Middlesex County Vocational School, New Brunswick, N. J.

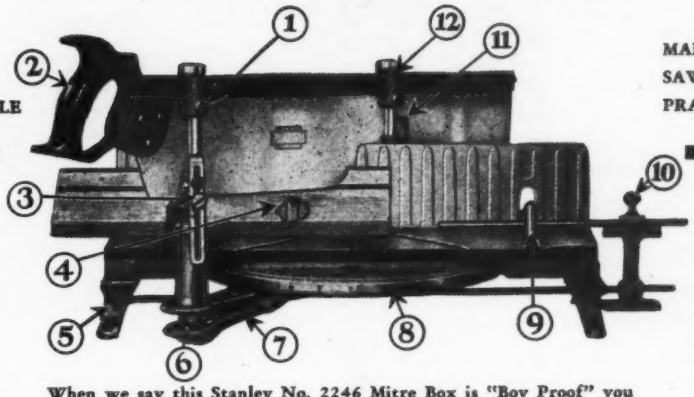
Educational director: Fred J. Hartman, National Savings and Trust Bldg., Fifteenth St., N.W., Washington, D. C. 412 719

Regional vice-presidents:

(Continued on page 31A)

IT MUST BE GOOD
to be "Boy Proof"

MALLEABLE IRON
SWIVEL AND UPRIGHTS
CAST IN ONE PIECE.
PRACTICALLY UNBREAKABLE



MALLEABLE IRON
SAW GUIDES
PRACTICALLY UNBREAKABLE

CHECK!

1. Two roller bearings in each saw guide produce smooth saw action.
2. First quality back saw.
3. Positive saw guide stops and depth stop plates control depth of saw cut. Serrated teeth on uprights and stops withstand severe use.
4. Adjustable spurs in back keep work from slipping.
5. Detachable legs of malleable iron are practically unbreakable.
6. Swivel lever and lift screw automatically raise front saw guide and saw out of kerf cuts when changing swivel position.

When we say this Stanley No. 2246 Mitre Box is "Boy Proof" you know it *must* be good . . . free of weak spots . . . rugged construction . . . simplified design with minimum number of parts. Because Stanley has engineered all those qualities into the tool along with high accuracy, this is a favorite mitre box among school shop instructors. Check over its many fine features. Write for Catalog 34, describing the Stanley line of Tools.

CHECK!

7. Swivel and uprights cast in one piece of malleable iron. Practically unbreakable.
8. Quadrant is graduated in degrees and is also numbered for sawing, 3, 4, 5, 6, 8, 12, 24 sided figures. Double locking, self-clamping swivel locks at any point of the quadrant.
9. Stock guides hold work tightly against the back.
10. Length stop for duplicate work.
11. Automatic saw guide catches hold saw above work while putting work in proper position.
12. Saw guides of malleable iron practically unbreakable.

EDUCATIONAL DEPT. **STANLEY TOOLS** NEW BRITAIN, CONN.
DIVISION OF THE STANLEY WORKS

(Continued from page 28A)

William R. Baker, The Stout Institute, Menomonie, Wis.
George Bilsey, East High School, Cleveland, Ohio.
Walter E. Brock, Presidio Junior High School, San Francisco, Calif.
James A. Gahan, Montreal Technical School, Montreal, Canada.
William Van Gasbeek, El Paso Technical Institue, El Paso, Tex.
Ralph E. Graber, Liberty Memorial High School, Lawrence, Kans.
Atwell L. Jobe, Frank Wiggins Trade School, Los Angeles, Calif.
Harold H. Kirk, Langley Junior High School, Washington, D. C.
Fred J. Landon, Dunwoody Institute, Minneapolis, Minn.
John S. Mahoney, Roxbury Memorial High School, Roxbury, Mass.
Dwight L. Marsee, Mishawaka Senior High School, Mishawaka, Ind.
Harold E. Sanger, Chicago School of Printing and Lithography, Chicago, Ill.
James A. Shields, Thomas A. Edison Vocational School, Elizabeth, N. J.
Joseph F. Sorace, Rochester Athenaeum and Mechanics Institute, Rochester, N. Y.
Ward W. Swain, Washington Vocational High School, Pittsburgh, Pa.
Board of directors:
Harold G. Crankshaw, Central High School, Washington, D. C.
J. Henry Holloway, The New York School of Printing, New York, N. Y.
C. Harold Lauck, Washington and Lee University, Lexington, Va.
Chester A. Lyle, Timken Vocational High School, Canton, Ohio.
Allan Robinson, The Mergenthaler School of Printing, Baltimore, Md.
Ferdy J. Tagle, The New York School of Printing, New York, N. Y.
John A. Backus, American Type Founders, Elizabeth, N. J.
Harry L. Gage, Mergenthaler Linotype Co., Brooklyn, N. Y.

The selection of the time and place of the next annual conference on printing education will be made by the board of directors at a later date. — *Fred J. Hartman.*

NEWS NOTES

♦ Iowa State College reports the largest summer school in the history of the college. Assisting Dr. T. A. Hippaka, director of industrial education, were L. H. Alberty, director of industrial and vocational education, Lincoln, Neb., O. B. Badger, assistant superintendent in charge of industrial and vocational education, Portland, Ore., Dean C. A. Bowman, the Stout Institute, Menomonie, Wis., John Paustian, division of engineering, University of Nebraska, Lowell Carver, Arthur Twogood, and Earl Baird, Iowa State College.

The master of science degree was conferred upon Lynn C. Adams, East Lansing, Mich., Ralph W. E. Bowers, Ottawa, Kans., Charles A. Burnes, Burlington, N. C., Lawson E. Hockey, Dubuque, Iowa, Frank L. Judish, High Point, N. C., Ray F. Kranzusch, Menomonie, Wis., Ellsworth M. Russell, Decatur, Ill., Forrest D. Sissell, Muscatine, Iowa, Loring F. Snook, Ames, Iowa, Leonard A. Stone, Mesa, Ariz., Kauko A. Wahtera, Battle Creek, Mich., Cecil Wriedt, Cedar Falls, Iowa.

Several men have indicated their intention to return for work leading to the Ph.D. degree.

♦ The 1941 Stout Institute summer session opened for registration on June 23, and continued for six weeks, closing August 1. While the majority of the courses were on the six-week basis, there were a number of short units on the three-week basis. The six-week courses were selected to meet the needs of the wide range of professional classifications of people using the Stout Institute summer sessions for professional advancement. The three-week short-unit courses were planned to assist in the handling of the many perplexing and rapidly developing problems in the practical phases of American education.

Roy R. Van Duzee, supervisor of industrial arts in the public schools, West Allis, Wis., Eiffel A. Holm, director of vocational and adult education in Wausau, Wis., T. S. Rees, director of vocational and adult education in Racine, Wis., Miss L. Belle Pollard, supervisor of adult homemaking education, St. Louis, Mo., John B. Coleman, director of vocational and adult education, La Crosse, Wis., Dr. Waldo B. Cookingham of the department of education, New York University, and recently a specialist in counseling and guidance in the Federal Office of Education; Paul Huber of Douglas, Ariz., Mrs. Helen Diamond Wicher, home-service consultant of Minneapolis, Minn., Guy J. Ehart, director of vocational and adult education, Janesville, Wis., Frank B. Jewson, co-ordinator, School of Vocational and Adult Education, Superior, Wis., were among those who assisted Dean Clyde A. Bowman in making the summer session at the Stout Institute. Many of the members of the regular session faculty were included on the summer school staff.

A strong schedule of conference leaders and special speakers was presented. Dr. Albert Edward Wiggam, nationally known educator and psychologist, opened the general assemblies for the summer session with his address "Who Shall Inherit America?"

During the third week of the summer session,

(Continued on page 36A)

SHOP EQUIPMENT NEWS
New Products—Publications

POST'S WHITEX

Good, clear blueprints are made from pencil tracings on The Frederick Post Co.'s new white tracing cloth, Whitex.

Every pencil mark or line on Post's No. 123 Whitex is dense and sharp, because the special processed velvety surface of this tracing cloth takes pencil perfectly. It is tough, durable, and will not discolor with age. Its glossy *stay-clean* back is an added feature, and its extra transparency adds speed to print production.

Failure of pencil drawings to make good blueprints and positive prints is, in the majority of cases, directly traceable to the drawing medium.

Because of the high degree of transparency and the texture that results in *ink-line* density from hard pencil, you will get *jet-black-on-pure-white* positive prints as well as knife-sharp major contrast blueprints from pencil drawings on Post's Whitex.

Whitex also erases quickly and cleanly with artgum or a soft eraser and erasures do not show on the blueprint. Detail does not smudge or rub off. Whitex takes colored pencils sharply and cleanly. All in all, it enables the draftsman to produce in fine detail and at pencil speed. *ink quality*, contrasty, professional-looking blueprints — from pencil drawings.

Samples of Whitex can be obtained by writing The Frederick Post Co., Box 803, Chicago.

PHANO LINE OF PENCILS ENLARGED

Purple and green are now available in the Phano line of pencils, manufactured by the Joseph Dixon Crucible Co., Jersey City, N. J. This brings the range of colors of the Phano pencils to 10.

The amplified color range is significant, because Phano is used largely for marking highly polished metal, glass, and glazed surfaces. The Phano pencil is specially designed to leave a clear, durable mark on polished surfaces without danger of scratching or scoring.

These pencils are used in industry, for marking metal parts for future identification or where instructions to workers or inspectors must be written on the part without danger of damaging the piece through abrasive action.

The aviation industry, for instance, is finding Phano useful for a myriad of tasks where an ordinary pencil might cause damage to expensive parts. Phano leaves a mark which adheres well, yet which may be removed when the operation is completed. The range of 10 colors enables parts to be marked for positive and instant identification throughout the whole manufacturing process. Phano provides the answer to layout work directly on the metal, since markings made with it will not wash off when the metal is sprayed during the cutting. Thus, layouts made directly on aluminum and stainless steel are common practice in the aviation industry.

The Phano line now includes red, yellow, black, vermillion, blue, white, purple, green, light green, and Pyro-red (brown). Phano's characteristic property of marking glass, celluloid, cellophane and all smooth surfaces without danger of damage to the material promises a host of new uses for it in the future.

NEW CINCINNATI 14, 16, AND 18-IN. HYDRAULIC UNIVERSAL GRINDING MACHINES

A new line of universal grinding machines, built in 14, 16, and 18-in. swings, and 36, 48, and 72-in. between-center lengths for each swing, have recently been announced by Cincinnati Grinders, Inc., Cincinnati, Ohio. These new "Hydraulic Universal" machines embody the following features.

The table is powered hydraulically, having infinitely variable traverse rates of 3 to 220 in. per minute. Power-table stroke may be set as

16 by 72 in. hydraulic universal grinding machine. Cincinnati Grinders, Inc.

short as 3/32 in., simulating the action obtained from a reciprocating grind-wheel spindle. Accuracy of automatic reversal is within .004 in., allowing the operator to power grind exceptionally close to shoulders without fear of spoiling the work. Hand table traverse has two speeds (mechanically controlled) — 1/10 in. per turn of the handwheel for close adjustment and grinding shoulders; 15/16 in. per turn for setting up. Hand servo-power control may be obtained as an extra. This feature is useful when the operator must frequently traverse the table by hand.

Filmatic bearings are used for the main grinding-wheel spindle. The bearing diameters of the spindle are superfinished to less than one micro inch. A plain bronze thrust bearing, self-adjusting for wear, is located midway between the ends of the spindle.

The wheel head may be swiveled 90 deg. right and left. Mounted directly on top of the wheel-head unit, a 5-h.p. motor drives the grinding-wheel spindle through the medium of V belts.

A hinge-type bracket at the front of the wheel head contains the internal grinding quill and spindle. The attachment is always in place, yet completely out of the way for any job within the capacity of the machine. It may be quickly set up by swinging it down and tightening only one bolt.

The headstock incorporates a new type of drive down known as the "Speed Ranger." By merely turning a handwheel at the front of the unit, an infinite number of speeds may be selected, ranging from 25 to 225 r.p.m. If desired, an optional range of 40 to 360 r.p.m. may be obtained. Graduations on the base of the unit are for a swivel range of 90 deg. forward and 30 deg. to the rear. The unit incorporates a quick-change device for live or dead spindle operation.

The hand-cross traverse has a two-speed arrangement; .050 in. per turn of the handwheel in low gear and .250 per turn in high gear. Diameter reduction as small as .0001 in. may be obtained by hand adjustment. Automatic pick feed may be set for one to seven notches on the cross-feed handwheel, reducing the work diameter .0004 in. to .014 in.

All controls, including the electrical push buttons, are closely grouped for operating convenience. To further reduce fatigue, the work rotation and coolant flow automatically start and stop with the table traverse start-stop lever. Independent controls are also provided for incidental work which does not require coolant, such as truing a part held in the chuck.

A 16-page illustrated catalog, No. G–474, may be obtained on request.

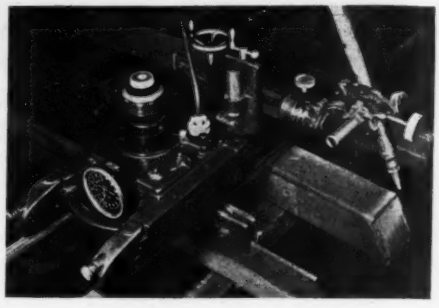
IMPROVED "MOTO-SAW"

The Dremel Manufacturing Co., Racine, Wis., have improved their electric scroll saw, known as the Moto-Saw to the extent that it is now possible to saw any length board up to 19 in. in width. This was done by means of two slots in the blade holder, which enables the operator to engage the saw blade at 90 deg. to the frame.

The turning of the saw blade is not new on expensive bench-type electric jig saws, but on those saws, a long board is rather awkward to manipulate. With the Moto-Saw, the board can be held stationary and the saw guided to follow the design. The saw weighs only 17 oz., and it takes little effort to operate it.

PROTRACTOR-TYPE TORCH HOLDER

Extra convenience and accuracy in setting Radiagraph cutting torches for any desired angle of cut is now made possible by the new Protractor Type Torch Holder, just introduced by the Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y. As an example of the type



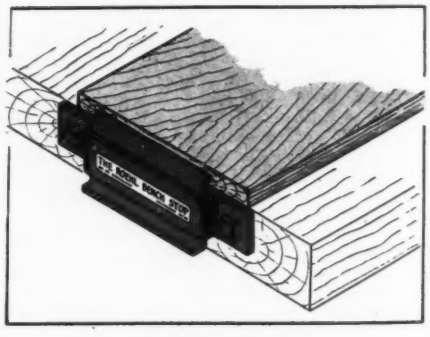
Protractor-type torch holder

of work for which the accuracy and timesaving features of the new holder are particularly valuable, a bevel cut billet is shown in the illustration. A circular knurled knob permits angular adjustment, as shown on the scale. The new holder which has a 90-deg. angle range can be attached to any standard Airco Radiagraph.

A REAL BENCH STOP

The bench stop, illustrated herewith, is manufactured and marketed by Louis M. Roehl, Ithaca, N. Y.

It is fastened to the end of the bench with two lag screws, thus doing away with the tail vise and the holes in the bench top required for the old-fashioned stops.



The Roehl bench stop

A slight pressure of the finger is sufficient for raising the new stop to the position needed for holding boards of varying thicknesses, and the stop may be pushed back level with the bench top just as easily.

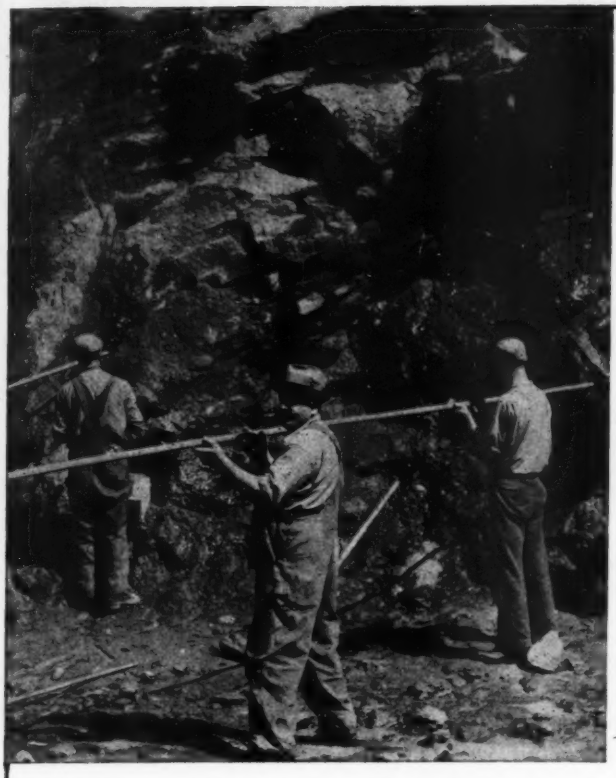
This new bench stop is very sturdy and will not get out of order. The sliding jaw is 4½ in. wide. Its smooth edge will not mar the end of the boards and its width will prevent the piece to be planed from whipping about.

Using this bench stop is an aid in teaching students to hold and plane boards as it is done in industry.

SUPPLY FIRM CHANGES NAME

Announcement has just been made of a change in the name of the firm of Bauman and Long, Goshen, Ind., to Long's Woodcraft Supply, specializing in home and school woodshop supplies. At the same time the firm announces completion of a large new building to take care

(Continued on page 35A)



PREPARING A BLAST AT THE GARNET MINES

Jewels from the Adirondacks

Yes, the same Garnet frequently polished into jewels is used as the coating for Behr-Manning's famous Garnet Abrasive Papers and Cloths. The hard, tough crystals when crushed, yield the very maximum of sharp cutting edges. Result—Industry's major woodworking coated abrasive.

It is very gratifying—the tremendous number of Vocational Instructors who are now ordering Garnet Cabinet and Finishing Paper for use in teaching woodworking to their students. These wide-awake gentlemen continue to follow the leads which Industry gives them, and are quick to pass them on to their boys.

May we tell you more about Garnet?

EDUCATIONAL SERVICE DEPARTMENT

BEHR-MANNING, TROY, N. Y.

(DIVISION OF NORTON COMPANY)

Quality Abrasives Since 1872

(Continued from page 32A)

of the growing demand for woodworking materials. Products handled by the firm include kiln-dried lumber, stock panels, special panels and tops, solid lumber tops, hardware, knocked-down furniture projects, kneehole desks, cedar chests, bookcases, tables, glue, finishing materials, and moldings.

ANNOUNCE NEW FACTORY

The Sheldon Machine Co., Inc., manufacturers of Sheldon precision lathes, arbor presses, vises, and the like, announce moving into their new factory at 4240–4250 No. Knox Ave., Chicago, Ill.

NEW CATALOG

The Frank Paxton Lumber Co., Des Moines, Iowa, has just issued its new 1941–42 catalog in which is listed the foreign and domestic hard- and softwoods stocked by this firm.

The catalog also describes the dowels, veneers, archery supplies, furniture squares, and plywood panels.

Directions for shipping and grading rules also are given.

NEW STARRETT BOOK FOR STUDENT MACHINISTS

As a timely and practical contribution to defense training, the L. S. Starrett Co., of Athol, Mass., has just published a manual of modern shop practice called "The Starrett Book for Student Machinists." Combining much of the material formerly published in two well-known and popular Starrett books, "The Starrett Book for Machinists' Apprentices" (Vol. 1) and "The Starrett Machinists' Data Book" (Vol. 2), the new book is actually both an instruction manual and a ready-reference handbook.

In order to make the book completely up to date and as practical and useful as possible, the text was prepared in cooperation with a number of leading vocational school and industrial shop training instructors. It contains 184 pages, over 200 diagrams and photographic illustrations and 30 reference tables. The book is completely indexed and covers the range of subjects and shop practices with which the student or young machinist is expected to be familiar. Written in clear, simple shop language, it includes such essential chapters as: How to read working drawings, precision tools and measuring practices, how to read a micrometer and a vernier, fits and limits of tolerance, benchwork, chipping, filing, metal sawing, drilling, lathe work, screw threads and tapers, toolmaking, jigs and fixtures, etc.

The new Starrett Book for Student Machinists is printed on a good grade of paper and is bound in sturdy, soil-resisting, red Terek cloth. It sells for 75 cents per copy.

HOW TO SHARPEN

The twenty-first revised 1941 edition of "How to Sharpen" has just been issued by the Behr-Manning Corporation, Division of Norton Co., Troy, N. Y.

This little booklet has long been the favorite of mechanics, farmers, homecraftsmen and shop students.

It describes in plain understandable terms, and illustrates with half tones and line cuts how to select, use, and care for all kinds of oilstones; also how to sharpen tools from the pocketknife to the most exacting type of cutting tool.

Full description of the full line of stones manufactured by this firm is also given.

BROCHURE ON FLEXIBLE-SHAFT MACHINES

A new 8-page brochure describing completely the various flexible-shaft machines available for defense industries has been issued by the Walker-Turner Co., Inc., Plainfield, N. J.

Equipment for use in grinding, polishing, burring, and for a host of other operations necessary in the manufacture of airplanes, airplane engines and parts, marine engines and accessories, in the automotive field, in general machine shops, foundries, and die shops is described in detail.

The machines illustrated range from heavy-duty models to commercial and intermittent duty types, and include bench, floor, and suspended models in direct drive, multispeed drive, and two-speed geared drive.

A copy of this brochure may be had upon request. Ask for Bulletin FS-41. Address Walker-Turner Co., Inc., 604 Berckman St., Plainfield, N. J.

NEW SOUTH BEND LATHE CATALOG

A new condensed catalog, No. 52, describing the entire line of South Bend Lathes has just been issued by the South Bend Lathe Works, Dept. K7, South Bend, Ind.

Containing only 8 pages, this 8½ by 11-in. catalog may be placed in a binder or filed in a standard letter file. The condensed data includes illustrations, basic dimensions, capacities, speeds and feeds of back-geared, screw-cutting lathes having 9, 10, 13, 14½, and 16-in. swings, with bed lengths from 3 to 12 ft.

In addition there are descriptions of numerous attachments for toolroom and production work.

NEW PEASE CATALOG NO. M-41

The new catalog M-41, issued by the C. F. Pease Co., 2601 West Irving Park Road, Chicago, Ill., presents a concise description of arc-lamp continuous blueprinting, washing and drying equipment; and arc lamps and high-pressure quartz tubes, and low-pressure mercury vapor tubes, for making blueprints and direct process prints. The catalog also describes blueprint and

(Continued on next page)

One of three Bradley Washfountains in the washroom adjoining the shop in the McClymonds High School, Oakland, Calif

For Health's Sake Give Your Students Modern Wash Fixtures

Clean, sanitary washing fixtures are a necessary part of every school and modern Bradley Washfountains have replaced the conventional single-person wash basins because they provide the ultimate in sanitation, save space, require 90 per cent fewer piping connections, and cut water consumption 70 per cent. They serve 8 to 10 simultaneously, with clean running water from a central sprayhead.

Bradley Washroom Consultants will gladly make washroom layout recommendations. BRADLEY WASHFOUNTAIN CO., 2269 W. Michigan Street, Milwaukee, Wisconsin.

BRADLEY
WASHFOUNTAINS

(Continued from previous page)

negative paper and cloth, Multazo dry direct process paper for producing "true to scale" reproductions, photographic arc lamps, and a complete line of blueprinting accessories and supplies. Illustrations and specifications of drafting-room furniture, including the most popular types of drawing tables, filing cabinets and other essentials are also part of the material contained in the catalog.

Copies will be furnished to any official, department head, or instructor who makes his request on a company letterhead, and indicates his position.

NEW SOUND SLIDE FILM

A 35mm. sound slide film entitled "Abrasive Wheels, Vital Tools of Industry," has just been issued by the Abrasive Co., Tacony and Fraley Sts., Philadelphia, Pa. It tells what grinding wheels are made of, how they are made, and what they are used for. This film runs for 15 minutes, and is accompanied by a 16-in. diameter record.

A nominal price of $5 has been placed on the record and film together. If desired, this sound slide film and record may be obtained in any quantity so that they are always available for instant use, no matter how many instructors want to make use of them at the same time.

DITTO INK-PRINTED WORKBOOKS

Ditto ink-printed workbooks which have become an institution in the school field because of their authenticity and careful preparation, have gone through a complete rejuvenating process during the past two years.

Twenty-five new and revised manuscripts are now included in the 50 or more workbooks for all grades in elementary schools. The materials are specifically designed for teaching, practice, and testing.

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A completely revised language and arithmetic series from the first grade through the eighth grade features the new materials.

Besides language and arithmetic, there are social studies, science, and safety books available. The many years of success which Ditto materials have experienced is evidence of their merit.

A catalog describing briefly the contents of each book is available by writing to Ditto, Inc., Harrison and Oakley Blvd., Chicago, Ill.

NEWS NOTES

(Continued from page 31A)

Dr. Verne C. Fryklund, associate professor of industrial education at the University of Minnesota, led a conference on "Major Problems in Industrial Education."

Mr. Frank Smothers, of the Foreign Service Division of the Chicago Daily News, presented his analytical address "Berlin-Rome-Tokyo Challenge."

During the fourth week, Wilfrid Laurier Husband, world traveler and student of housing, presented his lecture "How America Lives," which was illustrated with very fine color films.

Dr. George P. Hambrecht, state director of vocational and adult education for Wisconsin, was present at the Stout Institute to conduct a special conference on the defense training program.

In recent years the student body of the Stout Institute summer session has become a very cosmopolitan group. During the 1941 summer session the total enrollment of men and women, graduate and undergraduate, included students from teaching addresses in 23 states, Canada and Hawaii.

(Continued on page 41A)

1941 Summer session — Iowa State College, Ames, Iowa

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(Continued from page 36A)

Representatives from many of the tool and material supply houses, publishing firms, and others, brought their commercial exhibits to the 1941 Stout Institute summer session. These are always welcomed by the summer-session students as a convenience in securing materials, tools, and instructional material.

♦ The summer session just ended at East Texas State Teachers College, Commerce, Tex., has awarded bachelor degrees on the following industrial-education majors: J. L. Baird, Charlie Cregg, George W. Edwards, James Glascock, Collins Mahaffey, Truett Miller, Roy Ohmert, Roy Travis, James McCrary, Jack Morgan, Bryant Preston Parker, Boyce Richardson, Cosby Speir, Eckford White, C. S. Wiggs, and Billy Wooldridge.

♦ The United States Civil Service Commission has just announced an examination for steel-plate script engraver for positions at the Bureau of Printing and Engraving of the Treasury Department at $13.44 a day ($2.52 an hour for overtime).

The examination is open only until September 30, 1941, by which date applications must be in the hands of the Civil Service Commission to be considered.

Applicants must have had a 4 years' apprenticeship as steel-plate engraver or have had experience or training in steel-plate engraving, the substantial equivalent of such apprenticeship. In addition, applicants must have had at least 5 years of journeyman experience in highly skilled steel-plate script engraving, including cutting and etching.

Except for applicants granted military preference, the maximum age limit for this examination is 53 years.

Application forms and copies of the announcement (No. 129) may be secured at any first- or second-class post office or from any district office of the United States Civil Service Commission.

NEW PUBLICATIONS

Easy-to-Make Slip Covers

By Herbert Bast. Cloth, 62 pages, 7½ by 10¼. Price, $2. Published by the Bruce Publishing Co., Milwaukee, Wis.

The idea of using slip covers for protecting new or rejuvenating the appearance of old furniture, while not modern, is certainly quite popular today.

In this book, Mr. Bast, an experienced upholsterer himself, certainly has analyzed just what would trouble the beginner, and he has made his descriptions and his instructions so clear that they can be followed quite readily.

He shows, also, how to select the materials, how to measure the furniture, how to estimate quantities, and finally how to fit and sew the covers.

The descriptive material is divided into the following sections: Selecting Patterned and Colored Materials, Estimating Yardage Required, Layout Plan for Required Yardage, Measuring Furniture and Making a Layout, Cutting and Fitting a Slip Cover, Seams, the Seat, Fitting and Cutting Arms, Backs, Chair Wings, Skirt or Valance, Loose Cushions, Finishing Openings, Kitchen and Dining-Room Chair Covers, Love Seat, Overstuffed Armchair, Barrel Chair, Wing Chair, and Studio Couch or Day Bed.

Steel Square Pocket Book

By Dwight L. Stoddard. Cloth, 183 pages, 4 by 6. Price, $1. Published by the Scientific Book Corp., New York, N. Y.

This is the sixth edition of this book which has been found very helpful throughout the years by many mechanics in the building trades. This last edition contains a number of changes which were made to simplify and clarify the subject matter.

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We don't want to be alarmists but the plain facts are these:

The Government has placed defense priorities on many items—such as metals, tools and chemicals—many of which are used in Art, Industrial Art and Vocational Courses. Many of these items are no longer obtainable, others are advancing in price almost daily.

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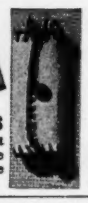

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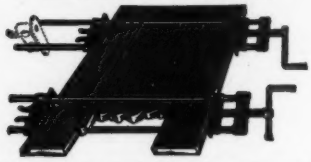

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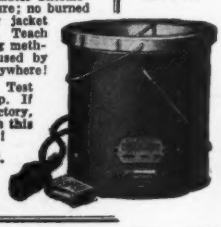

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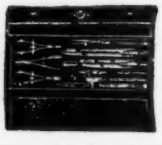

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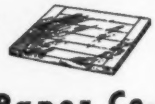

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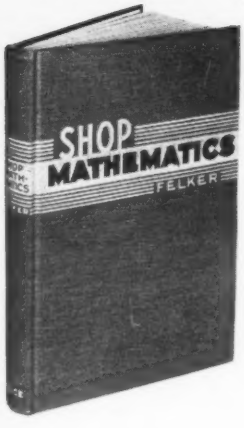

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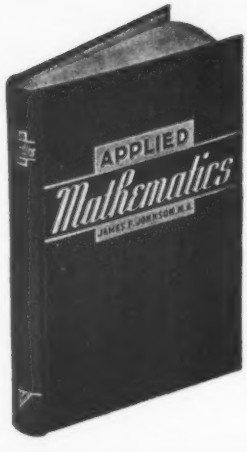

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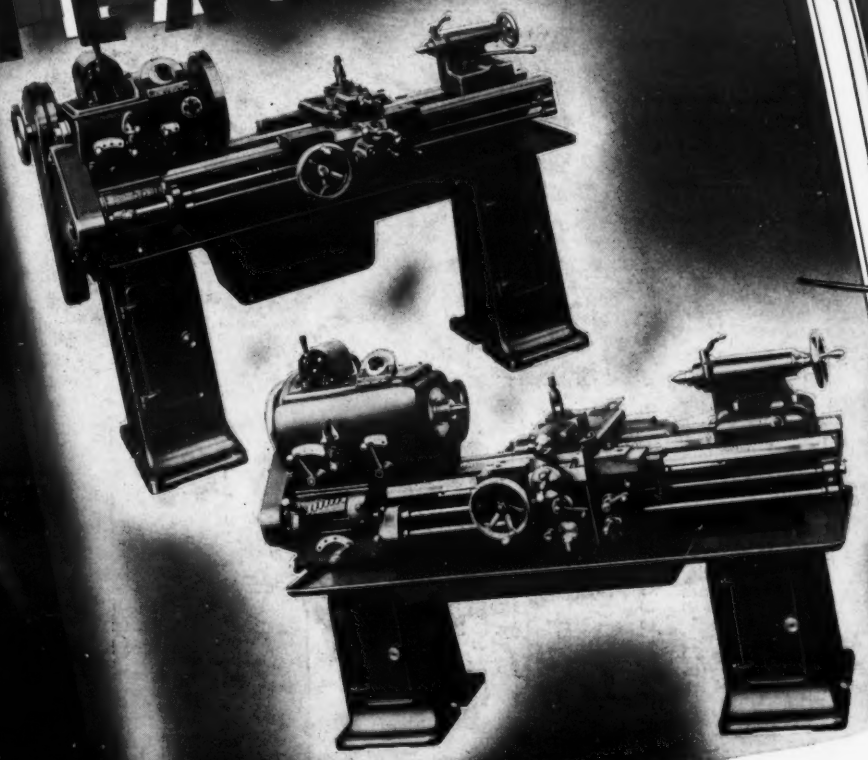

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